State of California
The Resources Agency

DEPARTMENT OF WATER RESOURCES
Division of Operations and Maintenance

STATE WATER PROJECT ANNUAL REPORT OF OPERATIONS 1997

August 2001

Gray Davis
Governor
State of California

Mary D. Nichols
Secretary for Resources
The Resources Agency

Thomas M. Hannigan
Director
Department of Water Resources

State of California
GRAY DAVIS, Governor

The Resources Agency
MARY D. NICHOLS, Secretary for Resources

Department of Water Resources
THOMAS M. HANNIGAN, Director

VACANT Deputy Director	STEVE MACAULAY Chief Deputy Director	RAYMOND D. HART Deputy Director

L. LUCINDA CHIPPONERI Assistant Director for Legislation	SUSAN N. WEBER Chief Counsel

DIVISION OF OPERATIONS AND MAINTENANCE

Stephen L. Kashiwada ..... Chief, Division of Operations and Maintenance
Don Kurosaka ..... Assistant to the Chief

This report was prepared under the direction of

Larry K. Gage ..... Chief, Operations Control Office
Jim Spence ..... Chief, Operations Planning Branch

by the
Project Records and Reports Section

Guy Masier ..... Section Chief
Michael Nolasco ..... Water Resources Engineering Associate
Fabricio Cordero ..... Engineer, Water Resources
Warren Dibben ..... Water Resources Technician II

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Foreword

This is the twenty-fourth in a series of annual reports summarizing the water and energy operation of the California State Water Project. Although the reports in this series are published considerably after the reference year, they document the official record of operations and provide an important source of historical data. This report summarizes the operation of Project facilities during 1997 and includes any revisions to data previously published in the more timely monthly "State Water Project, Operations Data" reports.

Acting Chief
Division of Operations and Maintenance

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Conversion Factors

Quantity	Multiply	By	To obtain
Area	acre	43,560	square feet
Volume	cubic foot	7.481	gallons
	cubic foot	62.4	pounds of water
	gallon	0.13368	cubic feet
	acre-foot	325,900	gallons
	acre-foot	43,560	cubic feet
	million gallons	3.07	acre-feet
Flow	cubic foot/second (cfs)	450	gallons/minute (gpm)
	gallons/minute	0.002228	cubic feet/second (cfs)
	million gallons/day	1.5472	cubic feet/second (cfs)
	cubic foot/second (cfs)	646,320	gallons a day
	cubic foot/second (cfs)	1.98	acre-feet a day
	million gallons/day (mgd)	1,120	acre-feet a year
Pressure	feet head of water	.433	pounds/square inch (psi)
Power	kilowatts (kW)	1.3405	horsepower (hp)

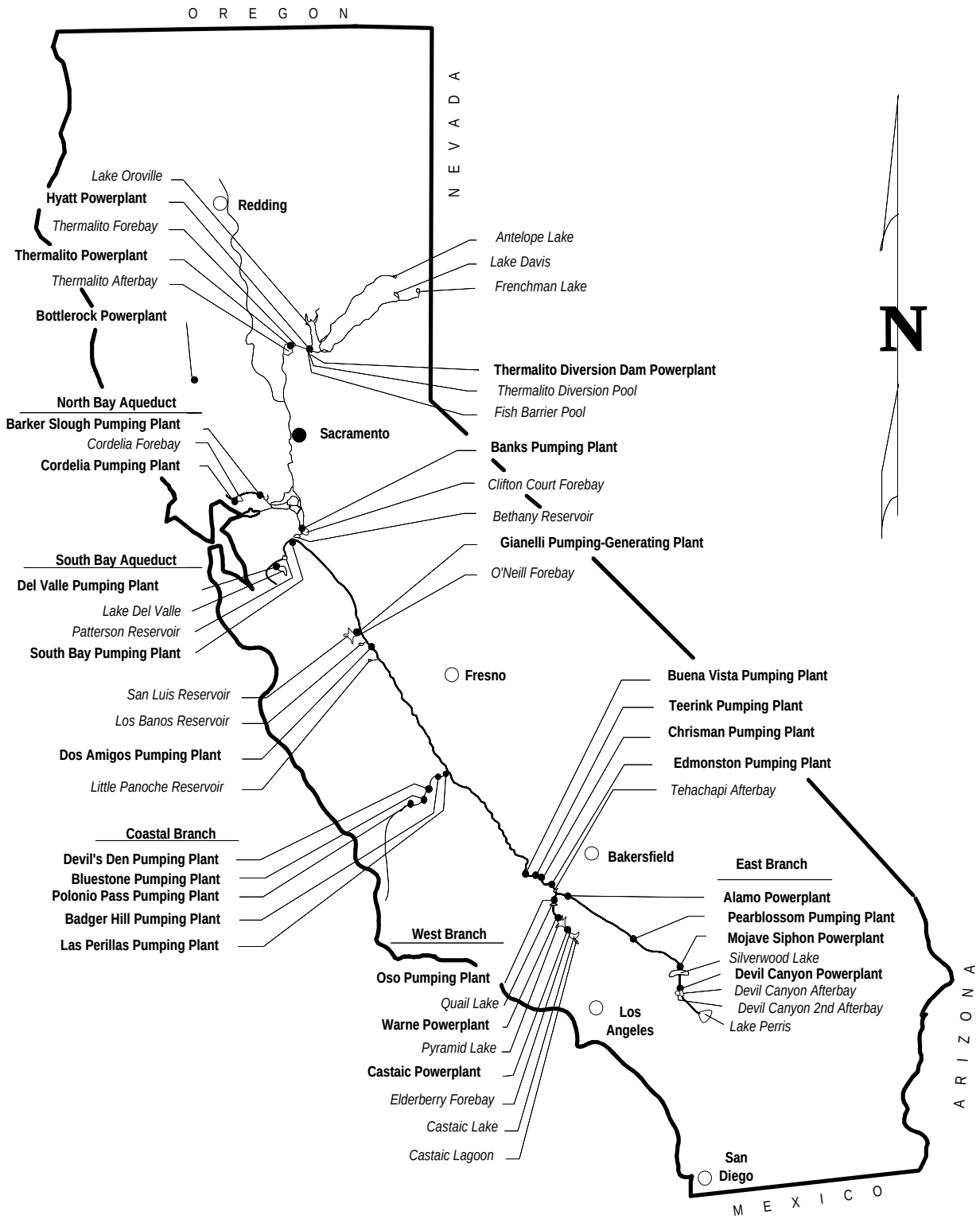
Abbreviations and Units

The following abbreviations are commonly used throughout this report.

AF	acre-feet
Banks	Harvey O. Banks Delta Pumping Plant
California Aqueduct	Governor Edmund G. Brown California Aqueduct
CEA	Capacity Exchange Agreement
cfs	cubic feet per second
CVP	Central Valley Project
D-1485	Water Rights Decision 1485
DFG	Department of Fish and Game
DO	dissolved oxygen
DOI	Delta Outflow Index
DPR	Department of Parks and Recreation
DWR	Department of Water Resources
EC	electrical conductivity
FRSA	Feather River Service Area
ft	feet
KCWA	Kern County Water Agency
kv	kilovolt
kW	kilowatt
kWh	kilowatt-hour
LADWP	Los Angeles Department of Water and Power
MAF	million acre-feet
MW	megawatt
MWh	megawatthour
MWDSC	Metropolitan Water District of Southern California
NDOI	Net Delta Outflow Index
PG&E	Pacific Gas and Electric Company
SCE	Southern California Edison
SDWA	South Delta Water Agency
SRI	Sacramento River Index
SWP	State Water Project
SWRCB	State Water Resources Control Board
USBR	United States Bureau of Reclamation

Map 1

Project Facilities



Introduction

The 1997 Annual Report of Operations for the State Water Project is divided into seven parts. The first two parts, "Highlights of 1997 Operation" and "Project Status in 1997," cover conditions and events of statewide significance. The following three sections cover water conditions, water operations, and energy operations in 1997. The sixth part, "Sacramento-San Joaquin Delta Operations," gives special emphasis to Delta operations, a key aspect of the SWP. The last part, "Project Operations by Field Division," provides details on activities by field division, the boundaries of which are outlined on Map 2.

Highlights of 1997 Operation

Managing available water supplies during the 1987-92 drought required activities designed to make the most beneficial use of water available to the SWP. The Department of Water Resources initially structured its plan of operations according to the concept of a firm yield. Firm yield is the quantity of water that can be made available on a firm annual basis to water contractors during a drought period. In 1991, after years of discussion, DWR changed its method of determining delivery amounts and replaced the concept of firm yield with the concept of variable yield. Operating on the basis of a variable yield makes efficient use of available water supplies during a drought. DWR also developed programs to compensate for the lack of storage facilities. These programs include water transfers, exchanges, loans, storage, purchases, and carry-over entitlement for delivery at a later date.

Total original requests for entitlement water were about 2.98 MAF. The initial allocation in December 1996 provided for 70 percent of Table A entitlements or 2.1 MAF. On February 11, 1997, due to increased supplies, DWR approved 100 percent of Table A or initial request, whichever is less. DWR made the final allocation of 2.98 MAF.

Water year 1996-1997 was the third wet year in a row and also had the biggest flood this century. The year started slightly wetter than average in the fall of 1996, particularly November. December was a very wet month with more than twice the monthly average precipitation by December 25. These earlier rains and a cold snowstorm in the Sierra saturated and primed the mountain watersheds. Then came the deluge that began in late December and continued into January and produced record flood flows in most of the major rivers in the Central Valley

After the December-January flood there was about a three-week break with little rain. During the break, only partial restoration of reservoir flood control space was achieved in the San Joaquin River. Then a new series of storms developed in the latter portion of January. The second series was not as intense and was also cooler which meant more precipitation in the mountains fell as snow. The second flood wave was easily handled by Sacramento River region. The San Joaquin River region situation was more critical but reservoir flood control operation was successful in preventing new levee breaks during the second storm event.

DWR and USBR declared balanced Delta water conditions three times during 1997: from April 10 to April 15, from May 19 to August 9, and from September 16 to November 24. This is the thirteenth out of the last fourteen years that balanced conditions have been declared.

The SWP depends on a complex system of dams, reservoirs, power plants, pumping plants, canals, and aqueducts to deliver water. Although initial transportation facilities were essentially completed in 1973, other facilities have been constructed since then and still others are under construction or are scheduled to be built as needed. The SWP facilities now comprise 27 dams and reservoirs, 25 pumping and generating plants, and nearly 600 miles of aqueducts.

Energy resources totaled 10,581,363 MWh which included generation of 6,244,916 MWh from SWP energy resources, purchases of 1,336,989 MWh, other resources of 416,657 MWh, and 2,581,801 MWh of SCE return additional (see Figure 4). Energy loads of 10,581,363 MWh include sales of 4,122,052 MWh, 5,443,184 MWh used to deliver water to SWP contractors, other project loads of 766,029 MWh, losses of 243,227 MWh, and 6,871 MWh of deviation (see Figure 6).

SWP facilities delivered 4,656,890 AF of water to 35 agencies, including 25 long-term water contractors, in 1997 as shown on Table 2. This amount is approximately 194 TAF less than the total State and federal water deliveries from the SWP in 1996. State contractor deliveries were 3,403,465 AF; including 2,005,060 AF of entitlement water and 1,398,405 AF of other water; excluding Joint Facilities and prior water right deliveries. See the *"Water Deliveries and Aqueduct Operations"* section for more details on water deliveries.

Map 2
Field Division Boundaries

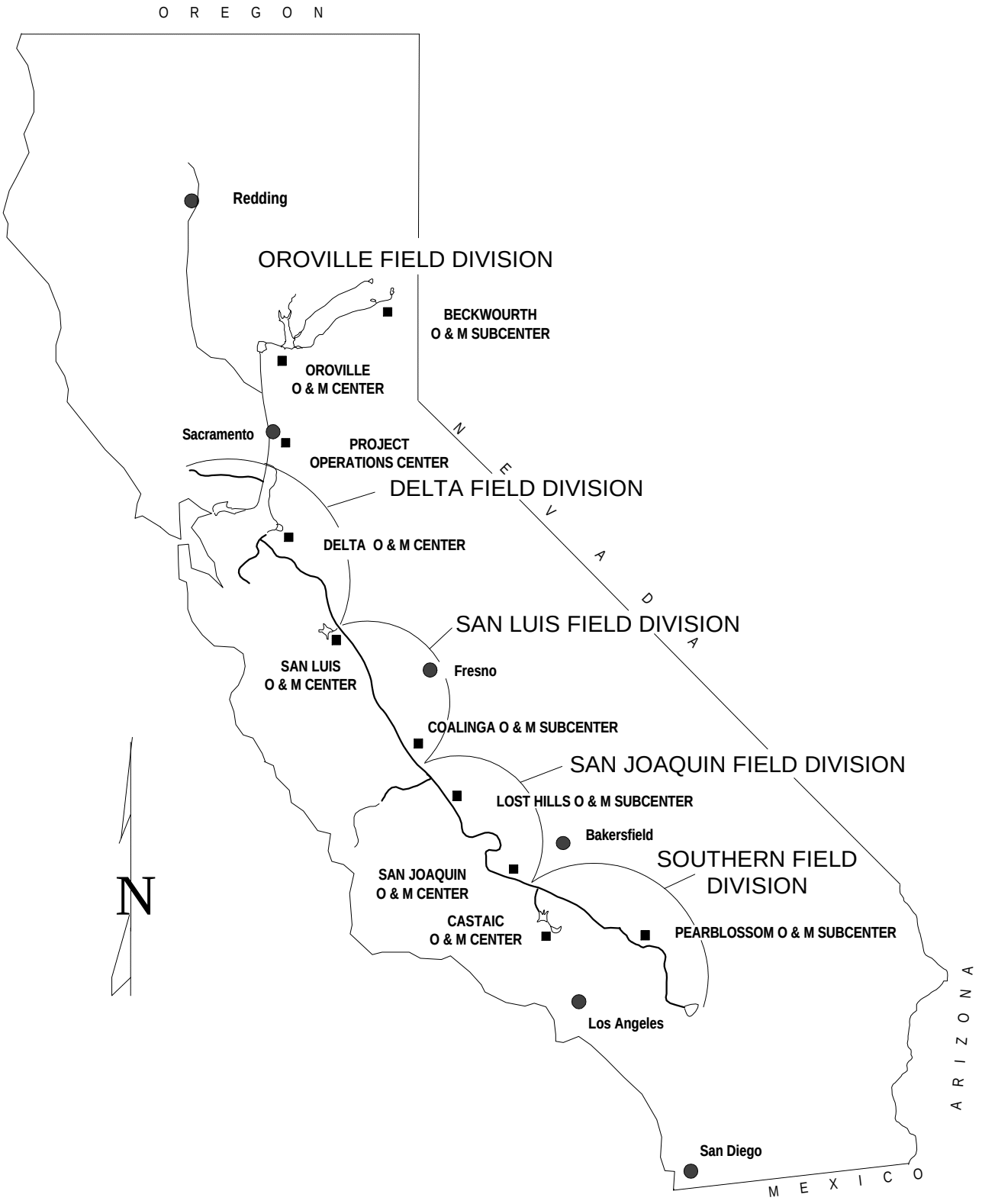


Table 1. Project Pumping by Plant
1997
(in acre-feet)

Pumping Plants	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hyatt	0	0	21,749	48,574	25,816	31,448	7,030	55,579	57,270	23,841	21,631	27,305	320,243
Thermalito	0	0	27,444	65,325	39,465	49,026	8,877	60,501	70,232	37,119	31,986	41,277	431,252
Barker Slough	1,087	1,010	1,236	2,011	4,869	5,300	5,955	5,750	3,606	3,371	2,863	2,235	39,293
Cordelia	937	882	981	1,103	2,274	2,426	2,861	2,695	2,090	2,013	1,973	1,607	21,842
Banks													
State	45,266	32,853	130,137	105,648	78,830	153,328	306,377	254,152	297,665	226,265	293,437	419,695	2,343,653
Federal	0	57,497	32,256	0	0	0	16,002	13,896	41,745	39,637	0	0	201,033
Total	45,266	90,350	162,393	105,648	78,830	153,328	322,379	268,048	339,410	265,902	293,437	419,695	2,544,686
South Bay	2,542	4,672	10,237	9,066	12,670	11,535	15,652	15,561	8,093	5,969	7,392	6,210	109,599
Del Valle	0	0	0	0	545	2,312	577	0	0	0	0	0	3,434
Gianelli 1/													
State	1,154	-1,077	5,422	-212	0	12,085	2,692	92,278	174,812	118,688	173,968	291,416	871,226
Federal	128,872	43,609	58,377	24,791	0	0	0	15,134	88,508	155,390	179,469	209,091	903,241
Total	130,026	42,532	63,799	24,579	0	12,085	2,692	107,412	263,320	274,078	353,437	500,507	1,774,467
O'Neill 2/													
State	0	0	0	0	0	0	0	0	0	0	0	0	0
Federal	130,544	19,531	211,545	75,446	13,795	44,352	12,914	68,562	87,609	161,672	203,489	237,594	1,267,053
Total	130,544	19,531	211,545	75,446	13,795	44,352	12,914	68,562	87,609	161,672	203,489	237,594	1,267,053
Dos Amigos 1/													
State	41,508	27,415	128,594	238,173	283,530	272,816	427,425	335,470	156,732	125,738	118,264	121,739	2,277,404
Federal	38,306	83,340	173,031	115,536	176,430	287,513	166,634	106,123	41,077	36,935	27,350	30,554	1,282,829
Other 4/	0	0	0	0	0	0	0	10,000	0	10,476	0	0	20,476
Total	79,814	110,755	301,625	353,709	459,960	560,329	594,059	451,593	197,809	173,149	145,614	152,293	3,580,709
Las Perillas	0	720	6,587	11,909	17,229	20,410	21,858	16,710	8,260	8,266	2,916	4,433	119,298
Badger Hill	1	801	6,848	12,574	19,234	21,948	23,635	17,988	8,712	8,549	3,245	4,713	128,248
Devil's Den	0	0	0	0	0	372	139	843	1,432	2,117	1,739	2,074	8,716
Bluestone	0	0	0	0	0	371	141	819	1,410	2,004	1,572	1,903	8,220
Polonio Pass	0	0	0	0	0	376	141	856	1,422	2,161	1,818	2,134	8,908
Buena Vista	39,443	24,607	84,980	157,939	154,115	120,752	133,340	117,167	101,472	82,136	73,240	65,608	1,154,799
Teerink	38,964	19,471	71,442	148,932	139,652	97,680	107,742	100,947	98,467	79,184	73,599	66,623	1,042,703
Chrisman	36,805	17,845	67,876	143,029	131,644	89,973	100,832	95,555	94,761	76,380	72,096	66,890	993,686
Edmonston	36,672	17,857	65,840	139,553	126,780	85,048	95,545	91,539	91,231	74,218	70,459	66,372	961,114
Oso	28,685	17,533	28,582	58,056	45,114	10,731	1,710	7,779	25,483	38,190	46,880	47,537	356,280
Castaic 3/	108,906	102,691	130,894	120,591	156,016	121,854	153,306	150,504	129,971	159,020	125,823	106,130	1,565,706
Pearblossom	3,948	46	29,471	72,388	71,769	59,334	77,970	70,125	55,643	29,239	19,556	16,330	505,819

1/ Joint state-federal facility.

2/ O'Neill Pumping Plant is a federal facility

3/ Pumping at Castaic Pumping Plant is for the city of Los Angeles.

4/ Pumping at Dos Amigos for Cross Valley Canal.

Project Status in 1997

Project Facilities

The SWP conserves water for distribution to much of California's population and to irrigated agriculture. It also provides flood control, water quality control, electrical power generation, new recreational opportunities, and enhancement of sport fisheries and wildlife habitat.

SWP facilities in operation during 1997 included: 27 water storage facilities, 3 pumping-generating plants, 5 power plants, 17 pumping plants, and nearly 600 miles of aqueduct.

The SWP begins with three small lakes on the Feather River tributaries: Lake Davis, Frenchman Lake, and Antelope Lake. The branches and forks of the Feather River flow into Lake Oroville, the SWP's principal reservoir with a capacity of about 3.5 MAF. From Oroville, water flows through a complex system of powerplants, then down the Feather River into the Sacramento River before reaching the Delta. From the northern Delta, water is supplied to Napa and Solano counties through the North Bay Aqueduct.

Near Byron, in the southern Delta, the SWP diverts water into Clifton Court Forebay for delivery south of the Delta. The Banks Pumping Plant lifts water into Bethany Reservoir. It is then lifted by the South Bay Pumping Plant into the South Bay Aqueduct. Through the South Bay Aqueduct water is supplied to Alameda and Santa Clara Counties. Most of the water from the Bethany Reservoir, however, flows into the Governor Edmund G. Brown California Aqueduct. At O'Neill Forebay, part of the water is pumped through the Gianelli Pumping-Generating Plant for storage in San Luis Reservoir until needed. DWR's share of storage in the reservoir is 1,062,183 AF.

Water not stored in San Luis Reservoir continues its flow south and is raised 1,069 ft by four pumping plants: Dos Amigos, Buena Vista, Teerink, and Chrisman. In the southern San Joaquin Valley, the Coastal Branch Aqueduct serves agricultural areas west of the California Aqueduct. At the Tehachapi Mountains, Edmonston Pumping Plant raises the water 1,926 ft and the water enters 8.5 miles of tunnels and siphons. Once the water has crossed the Tehachapi Mountains, it flows through the California Aqueduct into the Antelope Valley.

The California Aqueduct then divides into two branches, the East Branch and West Branch. The East Branch carries water through the Antelope Valley into Silverwood Lake. From Silverwood Lake, the water enters the San Bernardino Tunnel and drops 1,418 ft into Devil Canyon Powerplant, then to Lake Perris, SWP's southernmost reservoir.

Water in the West Branch flows through Warne Powerplant into Pyramid Lake. From Pyramid Lake the water flows through the Angeles Tunnel and Castaic Powerplant into Castaic Lake, terminus of the West Branch. For the location of facilities cited here, see Map 1.

Lake Oroville and San Luis Reservoir are the primary conservation facilities of the SWP's 27 dams and reservoirs. The remaining 25 dams and reservoirs are used principally to regulate the conserved supply into water delivery patterns designed to fit local needs. Of those 25, the five largest are Lake Del Valle, located in Alameda County; and Pyramid Lake, Castaic Lake, Silverwood Lake, and Lake Perris, in Southern California. Lake Del Valle is approximately four miles from the city of Livermore. The four southern reservoirs--Pyramid Lake, Castaic Lake, Silverwood Lake, and Lake Perris--are near the metropolitan areas of southern California, where water supplies are mainly imported. Information about these reservoirs, including amounts of unimpaired runoff to Lake Oroville and storage levels for SWP's conservation, and other storage facilities are summarized in this report.

Outages and Limitations

Major outages, construction, and operating limitations of SWP facilities during 1997 were:

January

- Devil Canyon Powerplant Units 3 and 4 out of service from January 9 to January 24 for annual maintenance on west bus and transmission line 2.
- Gianelli Pumping-Generating Plant Unit 4 out of service from January 9 to May 29 for unit overhaul.
- Devil Canyon Powerplant Units 1 through 4 out of service from January 20 to February 3 for scheduled tie-in of new intake tower.
- Warne Powerplant Unit 1 out of service from January 21 to February 11 for maintenance and oil leak repair.

February

- Badger Hill Pumping Plant Unit 2 out of service from February 3 to April 14 for annual maintenance.
- Devil Canyon Powerplant Units 1 through 4 out of service from February 3 to April 14 for construction work.

Table 2. Water Deliveries 1962-1997

(in acre-feet)

Agency	1962-1992	1993	1994	1995	1996	1997	TOTALS
Oroville Field Division							
Last Chance Creek W.D. (Local Supply)	203,604	10,879	8,921	8,919	11,404	12,590	256,317
Plumas Co. F.C. & W.C.D.*	8,637	444	492	308	360	231	10,472
County of Butte*	6,839	256	329	203	257	189	8,073
Thermalito I.D. (Local Supply)	28,379	2,096	2,318	2,321	2,613	1,730	39,457
Prior Water Rights Deliveries 1/	19,618,381	811,435	863,831	849,324	921,737	979,801	24,044,509
Yuba City*	2,693	746	1,035	910	820	1,005	7,209
Delta Field Division							
Napa CO. F.C. & W.C.D. *(Local Supply) 5/	140,586	5,286	6,792	5,182	4,893	4,341	167,080
Alameda Co. W.D.* (Local Supply)	587,644	14,909	22,911	23,085	23,850	25,022	697,421
A.C.F.C. & W.C.D., Zone 7* (Local Supply)	484,130	43,390	37,190	42,171	37,582	40,372	684,835
Pleasanton Township W.D.	674	0	0	0	0	0	674
Santa Clara Valley W.D.*	1,680,071	62,065	69,495	28,756	44,850	60,601	1,945,838
Marin W.D.	4,594	0	0	0	0	0	4,594
San Francisco W.D.	77,067	5,219	0	0	0	0	82,286
Skylonda M.W.D.	10	0	0	0	0	0	10
Oak Flat W.D.*	132,485	2,858	3,831	5,169	4,904	5,238	154,485
Mustang W.D.	4,256	0	0	0	0	0	4,256
Granite Construction	120	0	0	0	0	0	120
Lake Del Valle (E.B.R.P.D.)	2,299	143	168	146	150	155	3,061
Orestimba Creek	100	0	0	0	0	0	100
Recreation Fish and Wildlife	0	0	4,397	0	0		4,397
CVP Water	5,151	208	211	213	298	376	6,457
Solano Co. F.C.W.C.D.*	104,258	29,806	30,990	21,345	29,999	33,530	249,928
San Luis Field Division							
Dept. Parks & Rec. (STATE)	846	66	77	67	76	93	1,225
Dept. Fish & Game (STATE)	6,927	724	640	651	753	270	9,965
Fed. Customers (Rec.+ Joint-Use)	25,207,564	943,200	960,626	1,207,876	1,491,450	1,493,362	31,304,078
Fed. Customers (Misc.)	247,967	76	108	50	348	43	248,592
Westlands Water District	10,900	0	0	0	0	0	10,900
San Joaquin Field Division							
Tulare Lake Basin W.S.D.*	2,614,691	123,290	85,029	139,869	238,070	20,469	3,221,418
Empire West Side I. D.*	80,257	2,741	1,666	1,631	1,868	0	88,163
County Of Kings*	53,706	4,000	2,116	4,000	4,000	0	67,822
Hacienda W.D. 2/	75,895	0	0	0	0	0	75,895
Kern County Water Agency*	18,202,975	1,081,231	700,996	1,066,723	1,022,516	841,319	22,915,760
Kern Water Bank 4/	7,501	0	0	0	0	0	7,501
Dudley Ridge Water District*	1,261,397	23,418	32,419	45,485	53,353	68,638	1,484,710
Devils Den Water District	339,947	0	0	0	0	0	339,947
J.G. Boswell	117,430	0	0	0	0	0	117,430
Shell Cal Prod. 3/	85,914	0	0	0	0	0	85,914
Alameda County WD		0		0	6,200	10,000	16,200
Green Valley Water District	11,054	0	0	0	0	0	11,054
Federal Wheeling	1,170,126	12,552	48,370	9,725	9,206	11,272	1,261,251
Castaic Lake Water Agency	0	4,157	9,422	9,486	14,052	4,870	41,987
M.W.D. Of S.C.	92	50,000	0	50,000	95,000	126,486	321,578
Santa Clara Valley WD	0	0	0	0	45,000	35,000	80,000
San Luis Obispo County	0	0	0	0	0	1,099	1,099
Santa Barbara County	0	0	0	0	0	7,439	7,439
Central Coastal Water Authority	0	0	0	0	86	527	613
Department of Fish and Game	0	0	0	42	0	0	42
Southern Field Divison							
A.V.E.K. W.A.*	713,553	43,102	50,552	48,513	57,672	63,729	977,121
M.W.D. Of S.C*.	12,679,769	602,190	807,946	386,042	498,380	586,537	15,560,864
Littlerock Creek I. D.*	9,997	734	1,098	480	494	444	13,247
Mojave Water Agency*	69,181	11,734	16,253	7,495	6,111	12,638	123,412
Desert Water Agency*	402,027	38,100	23,257	38,100	102,622	69,990	674,096
Coachilla Valley Water District*	251,189	23,100	14,102	23,100	62,219	68,340	442,050
Crestline-Lake Arrowhead Water Agency*	25,686	946	1,193	884	1,209	1,138	31,056
San Gabriel Valley M.W.D.*	135,801	14,397	15,230	12,922	15,989	18,175	212,514
San Bernardino Valley M.W.D.*	254,629	6,552	9,135	696	6,064	9,654	286,730
Santa Barbara	1,240	0	0	0		0	1,240
Dept. Parks & Rec., L.A. Co. Rec. Dept.	55,863	1,676	2,918	1,669	2,928	3,624	68,678
Piru Creek Fish Enhancement	2,915	0	0	0		0	2,915
Castaic Lake Water Agency*	164,874	13,787	14,919	17,747	19,704	22,842	253,873
Palmdale Water District*	37,369	7,761	8,418	6,961	11,434	11,861	83,804
United Water C.D. (Local Supply)	998	0	0	0	0	0	998
Ventura County FCD*	5,824	0	0	0	0	1,850	7,674
Los Angeles Dept. of Water and Power	16	0	0	1,479	0	0	1,495
Lilico Pictures	10	0	0	0	0	0	10
Totals	87,398,108	3,999,274	3,859,401	4,069,745	4,850,521	4,656,890	108,833,939

* Long-term contractors

1/ Includes Thermalito Afterbay, Palermo Canal, Upper Feather lakes deliveries.

2/ Hacienda Water District was annexed by Tulare Lake Basin WSD in 1981.

3/ Repayment of preconsolidation water.

4/ Advance storage of ground water, by agreement between KCWA and DWR

5/ Includes 237 AF of Vallejo Permit water transferred to Napa.

- Thermalito Power Plant Unit 1 out of service from February 3 to April 30 for annual maintenance and stator rewedge.
- Edmonston Pumping Plant Unit 14 out of service from February 7 to September 4 to rewedge motor.
- Oso Pumping Plant Units 1, 2, and 4 out of service from February 7 to March 3 to replace 66kV bushings on transformer KYA.

March

- Reid Gardner Powerplant Unit 4 out of service from March 2 to June 16 to repair extensive boiler and adjacent facility damage following and explosion.
- Badger Hill Pumping Plant Unit 4 out of service from March 7 to March 31 for annual maintenance.
- Banks Pumping Plant Unit 8 out of service from March 12 to March 27 for excitation repair.
- Hyatt Powerplant Unit 4 out of service from March 26 to April 24 for annual maintenance.
- Banks Pumping Plant Unit 1 out of service from March 31 to June 2 for annual maintenance.

April

- Badger Hill Pumping Plant Unit 6 out of service from April 1 to April 17 for annual maintenance
- Mojave Siphon Powerplant Unit 1 out of service from April 6 to April 25 to repair a shaft seal leak.
- Mojave Siphon Powerplant Unit 2 out of service from April 6 to June 20 to repair a shaft seal leak.
- Edmonston Pumping Plant Unit 1 out of service from April 7 for a pump overhaul.
- Mojave Siphon Powerplant Unit 3 out of service from April 13 to June 19 to repair a shaft seal leak.
- Teerink Pumping Plant Unit 7 out of service from April 22 to December 28 for annual maintenance.
- Hyatt Powerplant Unit 3 out of service from April 30 to May 23 for annual maintenance.
- Thermalito Diversion Dam Powerplant out of service from April 30 to May 20 for annual maintenance.

May

- Dos Amigos Pumping Plant Unit 5 out of service from May 4 to July 21 for exciter repair and armature replacement.
- Oso Pumping Plant Unit 5 out of service from May 4 for stator repair and amortisseur winding replacement. Expected date of completion is October 1, 1998.
- Chrisman Pumping Plant Units 1, 2, and 3 out of service from May 19 for transformer KYA repair. Expected date of completion is January 30, 1998.
- Alamo Powerplant Unit 1 out of service from May 27 to June 21 to replace leaking shaft seals.

June

- Warne Powerplant Unit 2 out of service from June 2 to June 30 for annual maintenance of transformer KY2.
- Banks Pumping Plant Unit 2 out of service from June 9 to July 21 for annual maintenance.
- Chrisman Pumping Plant Unit 4 out of service from June 16 to June 24 for thrust bearing repair.

July

- Mojave Siphon Powerplant Unit 3 out of service from July 8 to August 11 for thrust bearing repair.
- Barker Slough Pumping Plant Unit 2 out of service from July 9 to July 30 to repair a discharge valve.
- Warne Powerplant Unit 1 out of service from July 18 to August 26 for transformer KY1 foundation works.
- Banks Pumping Plant Unit 5 out of service from July 21 to August 13 for upstream seal O-ring replacement.

August

- Devil Canyon Powerplant Units 2 out of service from August 4 to September 2 for annual maintenance.
- Mojave Siphon Powerplant Unit 3 out of service from August 16 to September 12 for shaft seal repair.

September

- Dos Amigos Pumping Plant Unit 1 out of service from September 2 for hub shaft repair. Expected completion DAT is June 23, 1998.
- Edmonston Pumping Plant Unit 2 out of service from September 4 to rewedge motor.

- Banks Pumping Plant Unit 11 out of service from September 14 to November 26 for discharge valve repair and exciter regulator adjustment.
- Hyatt Powerplant Unit 2 out of service from September 15 to September 29 for turbine shutoff valve repair.
- Warne Powerplant Unit 7 out of service from September 15 to October 19 for stator ground fault damage repair.
- Mojave Siphon Powerplant Unit 2 out of service from September 29 to November 5 for mechanical seal replacement.

October

- Pine Flat Powerplant Unit 3 out of service from October 6 to December 22 for annual maintenance.
- Hyatt Powerplant Units 4, 5, and 6 out of service from October 11 to December 19 for annual maintenance.
- Gianelli Pumping-Generating Plant Unit 2 out of service from October 13 to November 25 for biennial maintenance.
- Dos Amigos Pumping Plant Unit 2 out of service from October 14 to December 12 for biennial maintenance.
- Las Perillas Pumping Plant Unit 1 out of service from October 22 to December 17 for annual maintenance.
- Pearblossom Pumping Plant Unit 2 out of service from October 22 to November 21 for annual maintenance.

November

- Devil Canyon Powerplant Unit 4 out of service from November 3 to November 21 for annual maintenance.
- South Bay Pumping Plant Unit 3 out of service from November 14 to December 1 for trip testing.
- South Bay Pumping Plant Unit 1 out of service from November 17 to December 3 for current transformer replacement.
- Buena Vista Pumping Plant Unit 7 out of service from November 24 for impeller replacement and rotor balancing. Expected completion date is December 21, 1998.

December

- Los Perillas Pumping Plant Unit 2 out of service from December 6 for annual maintenance.
- Pearblossom Pumping Plant Unit 7 out of service from December 11 to December 30 for annual maintenance.
- Hyatt Powerplant Unit 4 out of service from December 19 to for annual maintenance and stator rewedge. Expected completion date is May 7, 1998.
- Pearblossom Pumping Plant Unit 8 out of service from December 20 for pump lower stat6ionary wearing ring repair. Expected completion date is September 10, 1998.
- Las Perillas Pumping Plant Unit 3 out of service from December 22 for annual maintenance.
- Pine Flat Powerplant Unit 2 out of service from December 22 for annual maintenance.
- Thermalito Powerplant Unit 1 out of service from December 22 for annual maintenance and wicket gate adjustment.

Water Supply Conditions

The SWP meets its contractual obligations by monitoring precipitation and calculating runoff to coordinate the operation of the complex system of dams and reservoirs. Information on those activities is based on the water supply conditions of the 1997 calendar year and the 1996-97 water year.

Water year 1996-1997 was the third wet year in a row and also had the biggest flood this century at many Central Valley foothill reservoirs including Oroville. The year started slightly wetter than average in the fall of 1996, particularly November. December was a very wet month with more than twice the monthly average precipitation by December 25. These earlier rains and a cold snowstorm in the Sierra saturated and primed the mountain watersheds. Then came the deluge late December-early January, which produced record flood flows in most of the major rivers in the Central Valley. Lake Oroville inflow peaked slightly over 300,000 cfs, exceeding the previous peak of around 266,000 cfs in February 1986.

After the December-January flood there was about a three-week break with little rain. This allowed the recovery of flood control space in Sacramento Basin reservoirs and time to make partial emergency repair

of the two large levee breaks on the Feather River and the Sutter Bypass. During the break, only partial restoration of reservoir flood control space was achieved in the San Joaquin River basin where downstream channel capacity is only about one tenth that of the Sacramento River system. Then a new series of storms developed in the latter portion of January. The second series was not as intense and was also cooler which meant more precipitation in the mountains fell as snow. The second flood wave was easily handled by Sacramento River region. The San Joaquin River region situation was more critical but reservoir flood control operation was successful in preventing new levee breaks during the second storm event.

After a very wet December and January, the season became one of the driest of record for the remainder of the rainy season – February through May. The northern Sierra had only 6.3 inches during that 4-month period, compared to a normal of almost 21 inches. This was the driest late winter and spring period of record in 76 years. The April 1 snowpack was only 75 percent of average in spite of some large amounts from the winter storms at the higher elevations. April through July Feather River snowmelt runoff was about 1.1 MAF, only 61 percent of average.

June precipitation was more than twice average, but the quantity was low and had little effect on runoff. The remaining three months of the water year, July through September, were near normal, but these months only account for 2 percent of annual precipitation in northern California.

Stateside precipitation for the water year, October 1996 through September 1997, turned out to be about 125 percent of average. Precipitation percentages are used in this report to express historical and regional comparisons. Additional and more specific information is available via the internet at: http://cdec.water.ca.gov/snow-rain.html.

Total runoff in the Sacramento River Basin in northern California has been as little as 5.1 MAF in 1977, and as much as 38 MAF in 1983 (the 50-year average is about 18 MAF). This runoff constitutes the primary SWP water supply.

Statewide runoff was about 145 percent of average for water year 1996-1997, compared to nearly 125 percent the previous year. The winter season started well with November runoff just slightly above average. December turned very wet, even before the large flood at the end of the month. Monthly statewide runoff was over 3-times average. January was even wetter with almost 4 times normal runoff. Runoff in February dropped below average to approximately 90 percent of average. Below normal runoff then continued through spring and summer, returning to average only during the final low flow month of September. Snowmelt runoff was less than average. April through July runoff was about two-thirds of average in the Sacramento River region and somewhat higher at around 90 percent in the San Joaquin River region.

Statewide reservoir storage started well above average at 120 percent on October 1, 1996, and remained above average all year ending at about 105 percent on September 30, 1997. There was a gradual drop from about 120 percent at the end of February to just slightly over average at the end of July, as operators used some of the accumulated storage to make up for the subnormal snowmelt runoff.

Water Operations

Reservoir Operations

Lake Oroville and San Luis Reservoir are the two main conservation facilities for SWP water supplies. Table 8 and Table 13 summarize the operations of these reservoirs during the 1997 calendar year.

Lake Oroville began 1997 with 2,929,103 AF of storage, 524,344 AF more than it held at the beginning of 1996. Computed inflow peaked in January and storage in Lake Oroville peaked on January 2, 1997 at 3,332,558 AF (94 percent of normal maximum operating capacity) and ended the year at 63 percent of normal capacity or 2,224,172 AF. The net effect of operations and water conditions at Lake Oroville resulted in a decrease in storage of 1,002,253 AF.

At the beginning of 1997, Lake Del Valle held 30,161 AF (81 percent of normal maximum operating capacity). Highest end-of-month storage was in May at 39,555 AF (99 percent of normal maximum operating capacity). At year's end Lake Del Valle held 26,088 AF (65 percent of normal maximum operating capacity).

At the start of 1997, San Luis Reservoir held 1,914,478 AF, 94 percent of its normal maximum operating capacity (2,027,835 AF); the SWP held 1,106,589 AF, 104 percent of its maximum operating capacity (1,062,183 AF). SWP storage at the end of 1997 decreased to 993,518 AF. End-of-year federal storage was 649,464 AF, for a year-end total of 1,642,982 AF.

SWP southern reservoirs (Pyramid, Castaic, Silverwood, and Perris) have a combined maximum operating storage capacity of 701,320 AF. The total combined storage of 594,940 AF at the beginning of 1997 increased to 631,104 AF by the end of the year.

The following tabulation compares normal operating capacity in the principal SWP reservoirs with end-of-year storage for 1996 and 1997:

Reservoir	Normal Maximum Operating Capacity	End-of-year Storage 1996	End-of-year Storage 1997
Lake Oroville	3,537,580	2,929,103	2,224,172
Lake Del Valle	40,000	30,161	26,088
San Luis Reservoir	1,062,183	1,105,936	993,518
Pyramid Lake	171,200	166,706	167,421
Silverwood Lake	74,970	14,977	69,229
Lake Perris	131,450	124,898	107,367
Castaic Lake	323,700	288,359	287,087
Totals	5,341,083	4,660,140	3,874,882

Water Deliveries and Aqueduct Operations

Generally, water diverted from the Sacramento-San Joaquin Delta is delivered to SWP storage facilities and to contractors through Banks Pumping Plant and Barker Slough Pumping Plant for a variety of beneficial uses. In addition to delivering entitlement water to long-term water supply contractors, SWP transports water to other public agencies through exchanges or purchases; provides water for wildlife and recreational uses; and conveys water to meet local water rights agreements. Historical information about water deliveries made to long-term contractors and other agencies through 1997 has been organized in Table 2.

For several years, DWR has offered contractors the opportunity to carry-over for delivery during the next year a portion of their entitlement water approved for delivery in the current year. The carry-over program was designed to encourage the most effective use of water, and to avoid obligating the contractors to use or lose the water by December 31. Because operational constraints may change from year to year, an agreement in which the conditions of the approval are listed is signed each year with participating contractors.

The Monterey Agreement grew out of water allocation concerns that intensified during the 1987-1992 drought. Rather than negotiate only water allocation issues, the Department and water contractors decided on a major revision to SWP long-term contracts and their administration—in essence, to update management of the SWP. The Monterey Agreement was released to the public December 16, 1994, in the form of 14 principles. *Bulletin 132-95, Chapter 1*, explains the Monterey Agreement in detail.

Make-up water is allocated to contractors according to Article 12(d) and Article 14(b) of the long-term water supply contracts. According to Article 12(d), if for some reason beyond DWR's control, water is not available for delivery according to the established schedule for that year, the water may be delivered at a later date. Article 14(b) of the long-term water supply contracts provides for the delivery of water at a later time if water is not delivered due to necessary investigations, inspections, maintenance, repairs, or replacement of SWP facilities. No make-up water as defined by Article 12(d) or Article 14(b) was delivered in 1997.

During 1997, SWP delivered project water to 35 agencies, including 25 long-term water contractors. SWP facilities were used to convey non-project water for other agencies, including the CVP. In addition, SWP facilities were used to deliver water transfers, water purchased from the Drought Water Bank, and transfers from one agency to another. Transfers were accomplished according to agreements negotiated with USBR throughout the year and with participants of existing three-party contracts for the use of the Cross Valley Canal, a water conveyance facility that connects with the California Aqueduct in Kern County.

Total Project (State and federal) deliveries for 1997 totaled 4,668,799 AF. This total includes State contract deliveries of 3,403,465 AF, federal deliveries of 1,252,472 AF, 12,819 AF of Upper Feather River deliveries, and 43 AF of non-chargeable refill water. State contract deliveries include a total of 2,005,060 AF of entitlement and entitlement-related water to 28 long-term contractors, plus 1,398,405 AF of other water. A graph showing the historical annual deliveries from SWP facilities is shown in Figure 1. Amounts of 1997 water deliveries are shown by field division on Map 3, and include entitlement water, permit water, local supply, recreation, purchases, wheeling, and water transfers. Totals by agency are shown in Table 2.

The following table is a summary of contract deliveries in 1997:

Entitlement Water		**Other Water**	
M & I	737,356	Flxbl Stor Withdrwl	1,256
Agricultural	829,436	General Wheeling	2,267
M GW	152,536	Local	1,016,840
Bypass	49,411	Recreation (State)	4,146
Interruptible	21,432	Transfer Water	76,732
Advanced	2	Purchase Pool A	1,529
Storage	171,486	Purchase Pool B	61,015
MWD - USBR return	25,900	Coastal Fill	527
Benecia	11,721	Exchange CVP	10,443
Vallejo	5,780	Exchange Water	191,168
		Flood Water Del.	32,482
Total	**2,005,060**	**Total**	**1,398,405**
Total Water		**3,403,465**	

Significant Operational Activities

January

- Over 19 inches of precipitation fell in the northern Sierra during January, more than twice normal. The seasonal average through the end of January stood at around 58 inches, also more than 200 percent of average. A total of 25 inches fell in the Feather River basin over an eight-day period ending January 3. Sacramento River flood system flows exceeded 600,000 cfs (the record is 650,000 cfs in February 1986). Two levee breaks along the Feather River and the Sutter Bypass inundated the town of Arboga and parts of Olivehurst while flooding more than 40,000 acres in Sutter county. Snow levels were high during the major storm events so the snowpack percentages were not quite as large, especially in the north where the mountains are lower. The statewide pack was about 160 percent of average for this date and already 100 percent of normal April 1 snowpack water content. About 35 percent of the snow accumulation season was left by the end of January.
- Runoff during January was almost 400 percent of average for the month. Storms which started at the end of December caused a daily average peak inflow of nearly 277,000 cfs at Oroville on January 1 which raised Oroville storage into flood control space. Antelope and Frenchman Lakes spilled a combined total of just over 26,000 AF. Oroville spill at just over 1.8 MAF was the largest monthly total on record since initial fill began in November 1967. The amount spilled at Oroville for 22 consecutive days ending January 17 was 2,013,299. Required flood control space was restored on January 12. The only other flood related release was at Lake Del Valle, 30,555 AF to Arroyo Valle. SWP began accepting floodwaters into the California Aqueduct through the Kern River Intertie on January 11, totaling 25,566 AF through the month. The water taken in would have otherwise caused increased flooding in the Tulare Lake Basin. East Branch outages, full reservoirs, and low demands have limited our ability to help the Tulare Lake interests. The California Aqueduct received minor inflows of floodwater from Salt Creek and Cantua Creek but none was taken into the canal from Arroyo Pasajero.

February

- February precipitation was only 20 percent of average. Northern Sierra precipitation was only about 1 inch compared to an average of 7.9 inches. The snowpack on February 1 was 155 percent of average overall and about 100 percent of the normal April 1 amount. Little change in snow water content took place in February. Runoff during February was about 90 percent of average, which compares to 390 percent in January and about 200 percent in February 1996. Some of this was residual runoff from the storms of January. Dry weather assisted efforts at emergency repairs of levee breaks.
- The liner repairs in Pool 49 of the California Aqueduct were completed. With storage levels near minimum at Silverwood Lake for work on the San Bernardino Tunnel, release through the tunnel was discontinued on February 3. MWD deliveries were made by pumpback from Lake Perris and by flow into Devil Canyon Afterbay 1 from SBVMWD and withdrawals from Devil Canyon Afterbay 2.

March

- Two additional temperature control shutters were added to each Hyatt intake structure for water temperature control at the Feather River Fish Hatchery making a total of seven shutters in each intake.

April

- On April 15, SWP and CVP began export reduction for the benefit of fish in the Delta. The combined export rate was set at 2,250 cfs as recommended by CALFED management team. CALFED operations coordination team worked on a methodology to make-up the lost exports which may involve relaxation of Delta standards, reducing in-stream flow releases next winter from Shasta and Oroville, and specific actions to manage the San Luis storage low point during the summer.

May

- DWR and USBR declared balanced water conditions in the Delta on May 19.
- The spring reduction in exports for San Joaquin salmon and Delta smelt was completed on May 15. Exports remained low through May 24 to accumulate the required days of X2 compliance and due to high salvage of Delta smelt at Skinner Fish Facility and Tracy.

June

- SWP operations were modified in late May and early June in response to concerns over the distribution of Delta smelt within the Delta. As a result of the driest spring on record for central California, the distribution of young-of-year Delta smelt is more typical of dry year hydrology, than a wet year as 1997 has been classified. A greater proportion of the population is remaining in the Delta through spring and summer. Historically, salvage of Delta smelt is substantially higher under dry conditions.

- Discussions within the CALFED Operations Group, the No-Name Group, and the Delta smelt Work Group resulted in actions to reduce exports in the second half of May, remove the temporary barrier at the head of Old River, and open the Delta Cross Channel gates. Consultation with USFWS later that month led to additional export reductions in early June (reduced to 500 to 700 cfs at Banks from the 7th through the 11th) and modification to the operations of the South Delta Temporary Barriers. Because of this reduction in exports, the CALFED Management Team agreed (and the SWRCB executive director concurred) to increase the export-to-inflow ratio from 35 to 40 percent through the remainder of June.
- Delta smelt salvage and distribution, as well as SWP/CVP operations, were closely monitored throughout June. Fortunately, Delta smelt salvage began declining in mid-June and remained very low through June 23. SWP and CVP were able to maintain an export-to-inflow ratio of 40 percent throughout the latter part of June, and the south Delta Temporary Barriers became fully operational on June 24.

July

- SWP operations were modified in late May and early June in response to concerns over the distribution and elevated salvage of Delta smelt. As a result of the driest spring on record for central California, the distribution of young-of-year Delta smelt is more typical of dry year hydrology than a wet year as 1997 has been classified. Historically, salvage of Delta smelt is substantially higher under dry conditions. However, the SWP and CVP operated under the more restrictive Delta smelt "wet-year" criteria.

August

- SWP exports from the Delta were sharply curtailed on August 8 due to a leak in the California Aqueduct in pool 10 at mile 54.95. Exports at Banks were restricted to supply demands on the South Bay Aqueduct only while Feather River releases were decreased from 6,000 cfs to 3,000 cfs due to decreased exports. The leak caused DWR Field Division personnel to request an immediate drawdown (11 feet) of pools 10, 11, and 12 at an emergency rate to prevent embankment failure by draining water into O'Neill Forebay. The rapid drawdown caused liner damage in pool 12. Delta outflows surpassed regulatory and environmental mandates due to this curtailment and excess conditions in the Delta were declared on August 9. Repairs on the leak at pool 10 were completed and the refilling of pools 10, 11, and 12 started on August 14 with water deliveries through these pools beginning on August 15. A special condition was placed on pool 12 on August 21 to maintain the water surface elevation at 225.32 feet for flow testing and other final pool repairs.

September

- Pools 10, 11, and 12 of the aqueduct were released for operation of up to 9,000 cfs following temporary repairs of leak and slide areas. Castaic Lake was drawn down to 240,000 AF for slope stabilization and safety related repairs by Boating and Waterways near the boat ramp.
- SWP exports from the Delta continued at about 6,400 cfs. On September 17, SWP began pumping 3,000 AF per day for USBR. The water was partially make-up for the April-May export curtailments done to benefit San Joaquin River salmon and Delta smelt.
- A drawdown of Lake Davis of approximately 250 AF per day began on September 24 in preparation for the rotenone treatment. A drawdown of approximately 250 AF per day of Lake Del Valle began on September 5 in preparation for flood control.

October

- During the first week of October, work began on repairs to the damaged spillway invert at Lake Oroville. This damage was caused by the January 1997 flood releases. The damage was discovered after a September 17 inspection that was delayed because of high lake levels. At the request of the Division of Safety of Dams, a slowly eroding seam in the rock foundation below the spillway was also repaired.
- Thermalito Diversion Dam releases were increased to 900 cfs during the second week of October. This facilitated the multi-year evaluation of increased flow effects on salmon spawning in the low flow section of the Feather River.
- A two week Anadromous Fish Recovery Program experiment, measuring the rate of increase in salinity with the Delta Cross Channel gates closed, was discontinued after nine days due to water quality concerns in the interior Delta. The stoplogs for the Suisun Marsh Salinity Control Gates were installed and operation of the gate to control salinity in the marsh began on October 14.
- The Department of Fish and Game completed the rotenone treatment of Lake Davis by October 24. Stream releases from Lake Davis were curtailed to 5 cfs until the lake waters were determined to be clear of all chemicals used in the treatment process.

Map 3
1997 Water Deliveries
(in acre-feet)

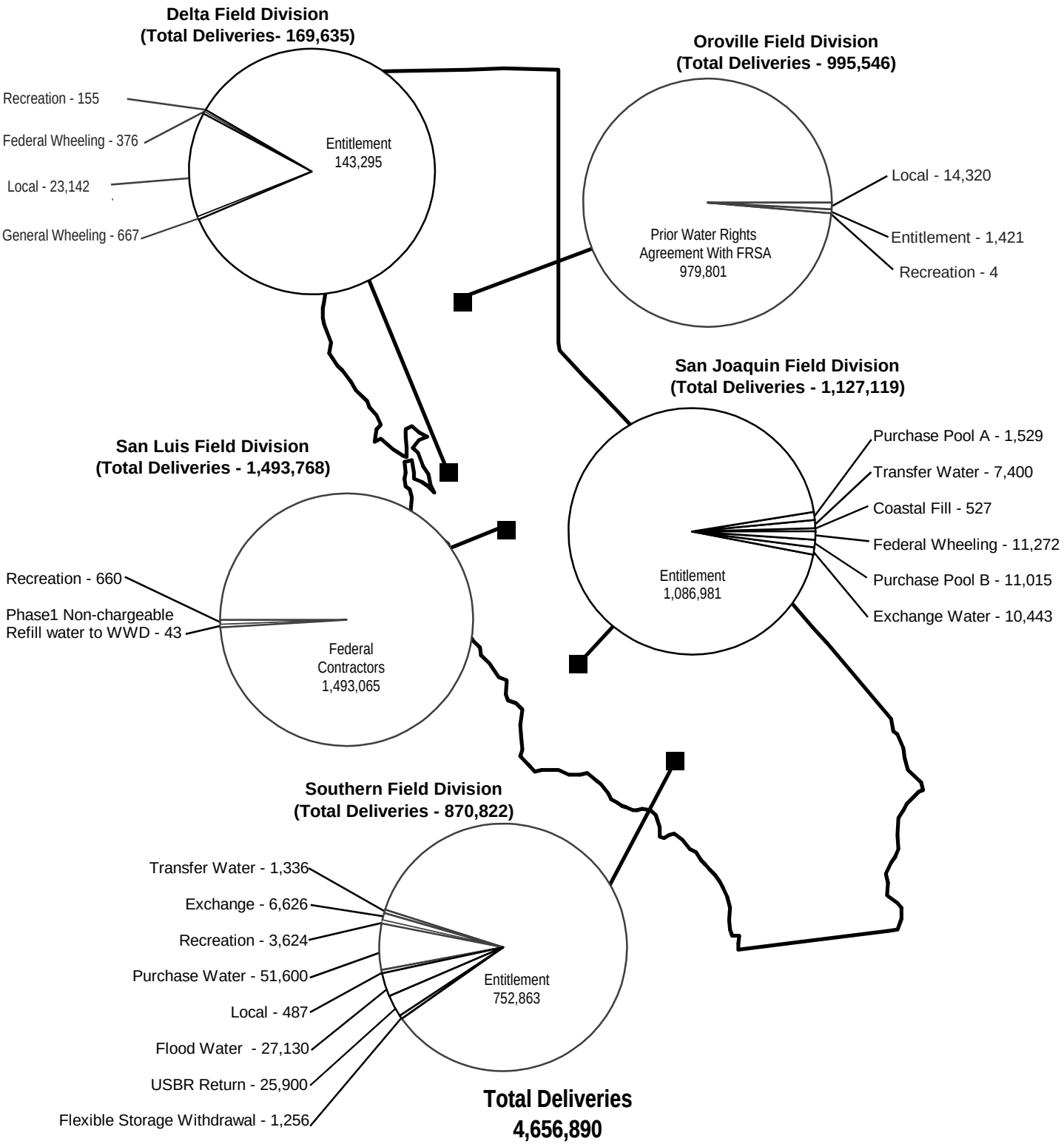
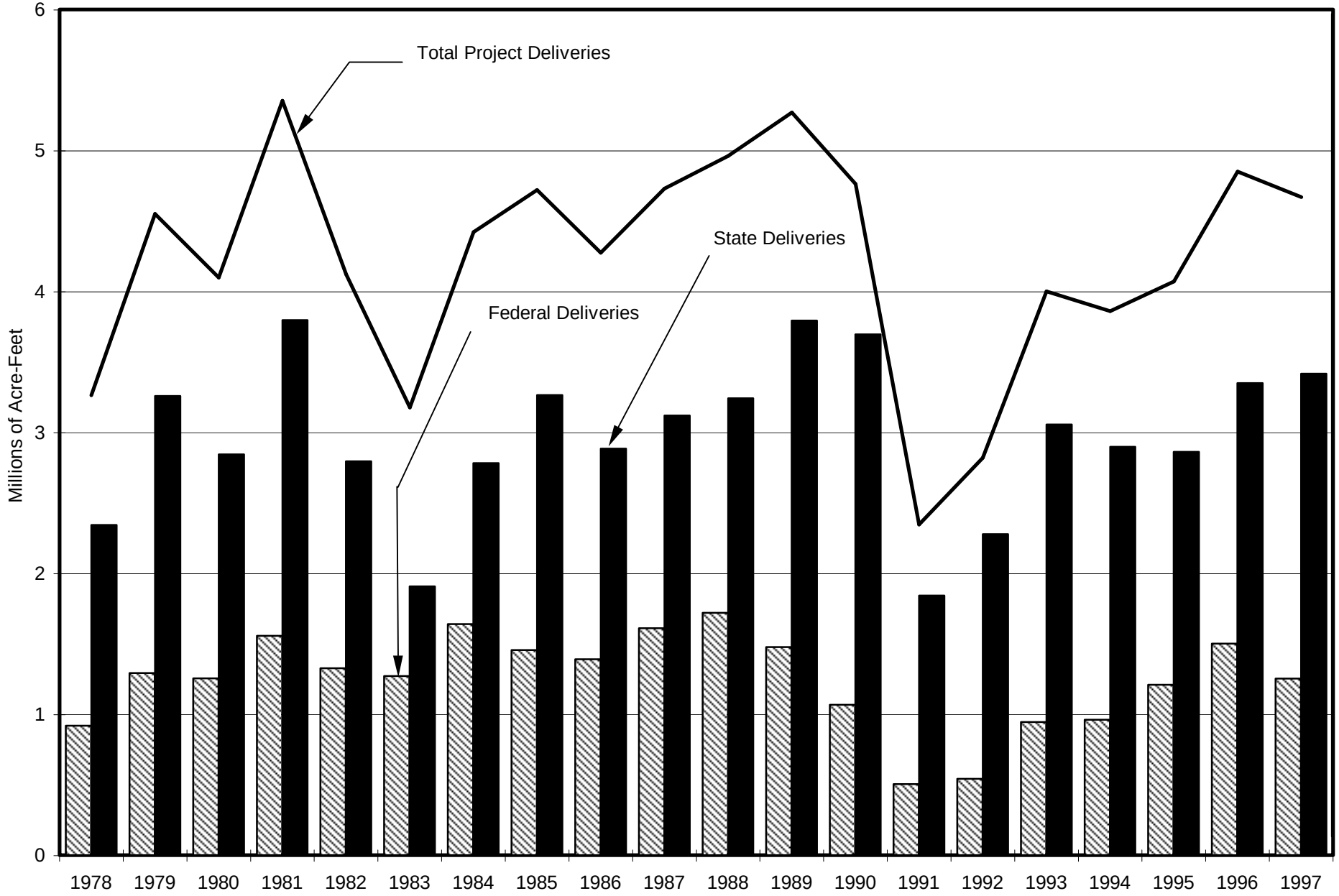


Figure 1. Total Deliveries from SWP Facilities

Annual Totals



November

- The monthly average Net Delta Outflow Index for November was relaxed from the 4,500 cfs required by the winter-run/delta smelt biological opinions to 4,000 cfs, as agreed to by the CALFED Ops Group in the Water Supply Recovery Plan for Spring 1997 actions.
- Export operations were restricted as a result of Delta water quality concerns. Of particular concern was maintaining chlorides at Contra Costa Canal Pumping Plant No. 1 below the municipal and industrial objective of 250 mg/l or less.
- Pool No. 37 lining damage was repaired during the first week in November.
- Warne Powerplant Unit 2 stator repairs were completed in the first week of November.
- Repairs of erosion damage at the west ramp launch area of Castaic Lake were completed and refill of the reservoir was initiated.
- Drawdown of Lake Del Valle to 25,000 AF was completed during the first week of November, bringing its storage down to normal early winter operating levels.
- Thermalito Diversion Dam releases remained at 900 cfs during November. This facilitated the multi-year evaluation of increased flow effects on salmon spawning in the low flow section of the Feather River.

December

- Salvage of winter-run size Chinook salmon began at both Skinner and Tracy fish facilities. The season total, as of December 28, was 27 observed fish for an estimated loss of 1,086 at Skinner and 12 observed at Tracy for a loss of 98. The combined seasonal "yellow light" take level was 1,400, the "red light" take level was 2,800. Seventeen Delta smelt have been observed for an expanded salvage of 209 combined at Skinner and Tracy, as of December 28. The "red light" take level for Delta smelt for December was 733.
- Thermalito Diversion Dam releases remained at 900 cfs during December. This facilitated the multi-year evaluation of increased flow effects on salmon spawning in the low flow section of the Feather River.
- The water surface elevation at Castaic Lake was increased by 18 feet as the lake was refilled following completion of boat ramp construction.

Energy Operations

Energy Resources

Energy generation from SWP's seven hydroelectric plants (Hyatt, Thermalito, Gianelli, Warne, Castaic, Alamo, Mojave, and Devil Canyon) during 1997 totaled 4,103,061 MWh, as illustrated in Figure 3.

The SWP receives energy under contract from five small hydroelectric facilities (total capacity of 30 MW) owned and operated by MWDSC. In 1997, these plants furnished 146,129 MWh of energy to the SWP. DWR has exchange arrangements with Southern California Edison and the Los Angeles Department of Water and Power to provide transmission of this energy.

The largest portion of the energy used by the SWP is provided by the 1979 Power Contract and the 1981 Capacity Exchange Agreement with Southern California Edison Company.

The DWR-SCE Power Contract has been in effect since April 1983. Under this contract, part of the Hyatt Thermalito Power plants' generation and all of the output of Devil Canyon Power Plant and Alamo Power Plant are delivered to SCE. The energy is generally delivered during on-peak periods and a greater amount of energy is returned during off-peak periods. SCE combined return and additional to the SWP during 1997 was 2,582,801 MWh.

The Capacity Exchange Agreement has been in effect since April 1987. According to the terms of the CEA, each year the SWP must provide 412,500 MWh of energy to SCE during on-peak periods at a maximum delivery rate of 225 MW. SCE returns approximately 110 percent of the energy during mid-peak and off-peak periods. CEA energy returned to SWP during 1997 was 412,500 MWh.

SWP purchases hydroelectric energy generated by other utilities. The output of the 190 MW Pine Flat Powerplant, owned and operated by the Kings River Conservation District, supplies the SWP about 400,000 MWh of energy in median water years. Pine Flat furnished the SWP 768,225 MWh of energy during 1997.

Since July 1983, SWP has received energy from Reid Gardner Powerplant, a coal-fired facility near Las Vegas, Nevada. SWP received 815,001 MWh of energy from Reid Gardner during 1997.

Long term contracted energy purchases, such as MWD Hydro, are itemized separately in Table 3. Other purchases totaled 1,336,989 MWh from various utilities, such as Pacific Power and Light and Salt River Project.

Energy resource data is summarized in Table 3, and Figures 3 and 4. SWP energy resources for 1997 totaled 10,581,363 MWh.

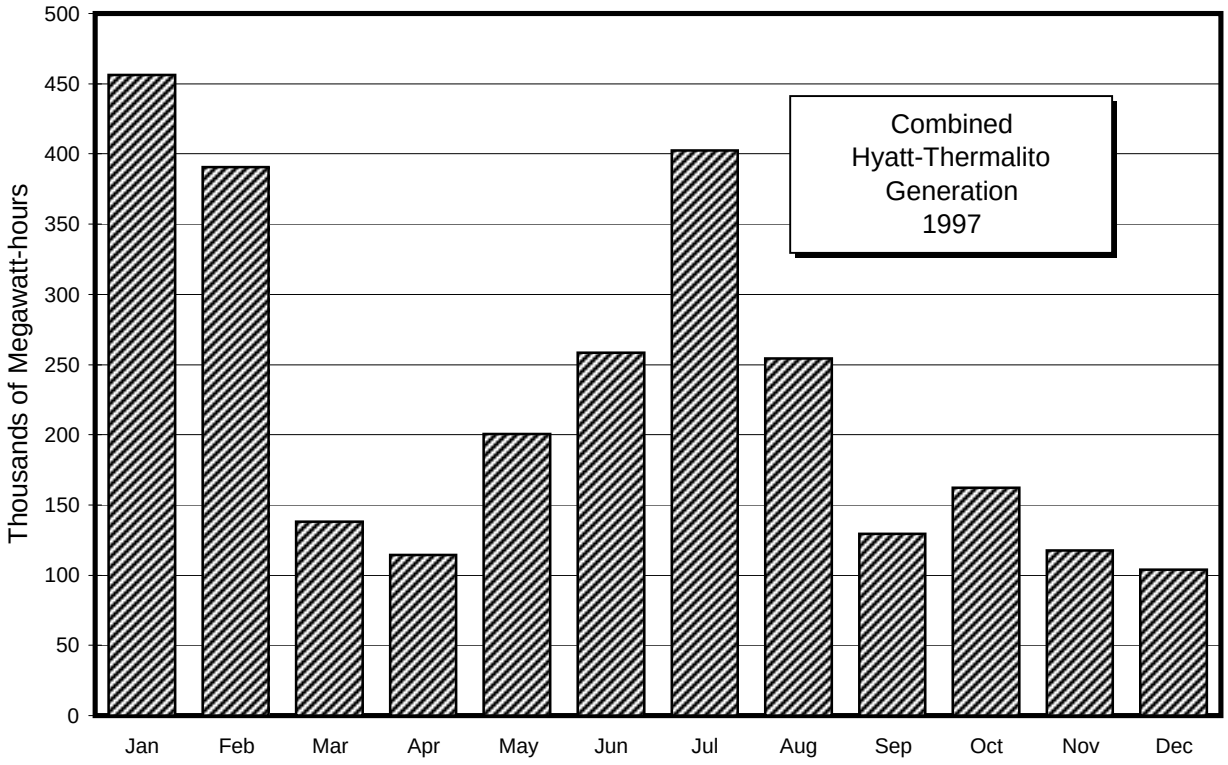
Energy Loads

Energy load data (total energy used by the SWP) is summarized in Table 4, and Figures 5 and 6. For the purposes of balancing energy resources and loads, this report itemizes those amounts required to meet SWP supplies and demands separately from those amounts required to meet total DWR supplies and demands. Besides SWP energy loads of 6,209,214 MWh, total State energy loads include sales of 4,122,052 MWh, losses of 243,227 MWh, and deviation adjustments of 6,871 MWh, for a total of 10,581,363 MWh.

The San Joaquin Field Division, which includes the only stretch of Aqueduct with no reservoirs, accounted for over half of the total project energy load. Included in this amount is 2,172,010 MWh used at Edmonston Pumping Plant with peak pumping occurring in August.

In 1997, the Department sold power to 40 agencies, resulting in revenues of over $77.4 million. The largest sale was 620,141 MWh to Southern California Edison.

Figure 2. Combined Operation of Hyatt-Thermalito Powerplants



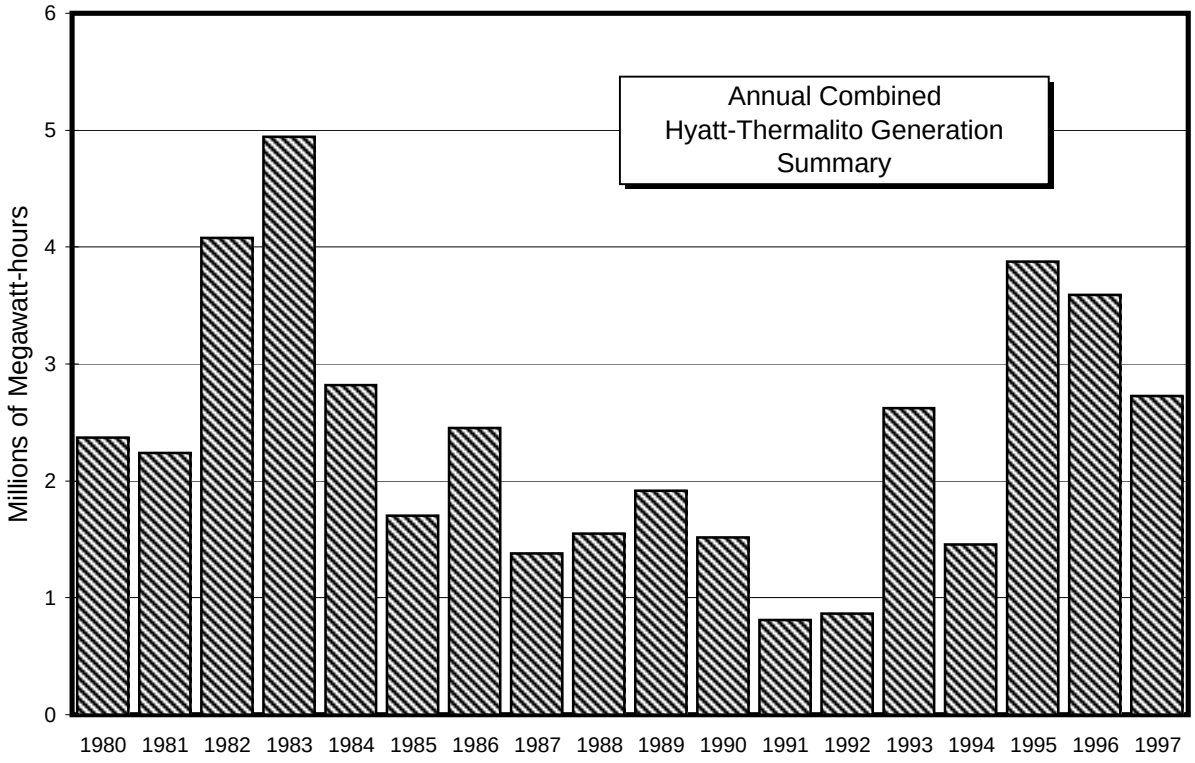
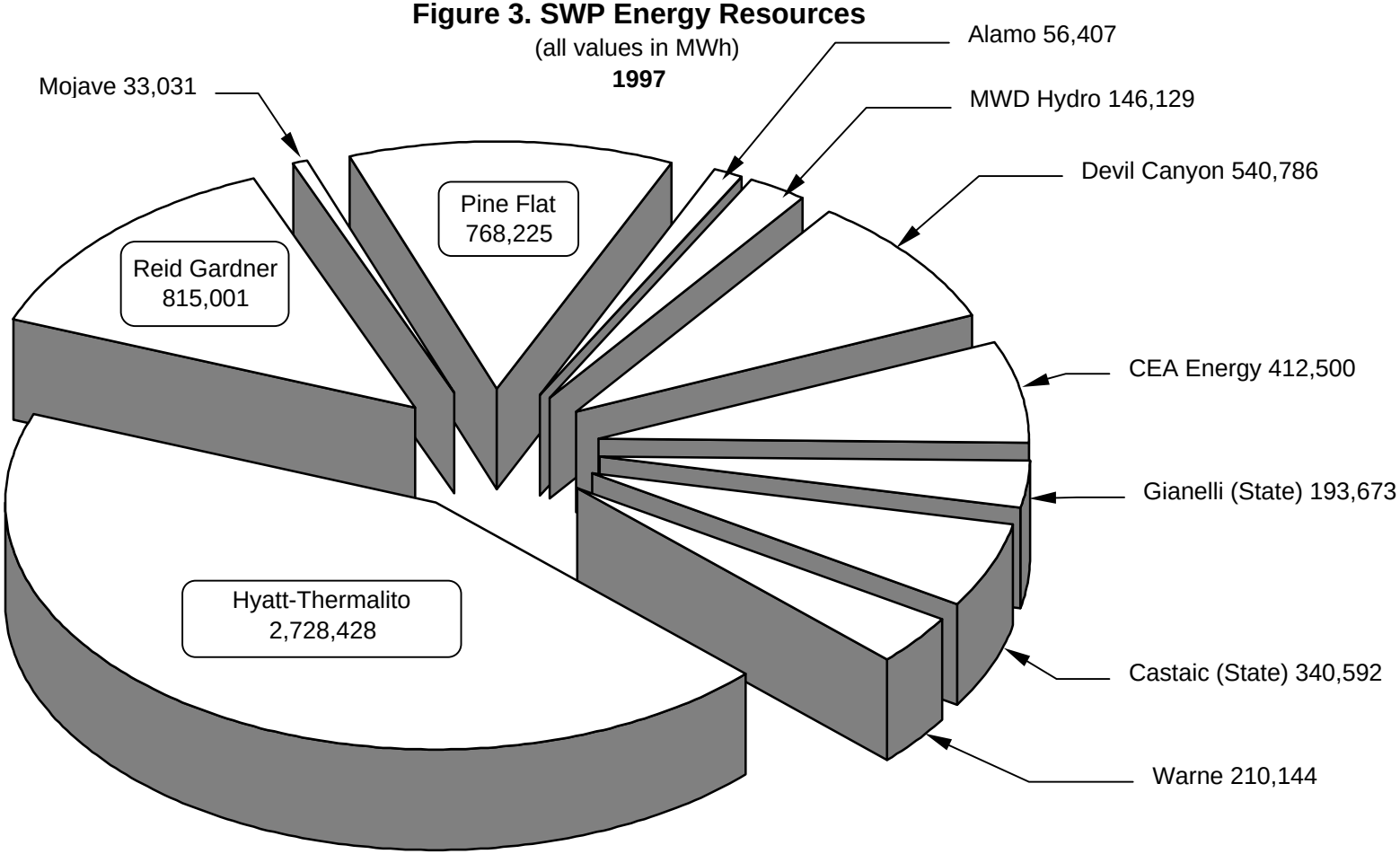


Figure 3. SWP Energy Resources

(all values in MWh)

1997



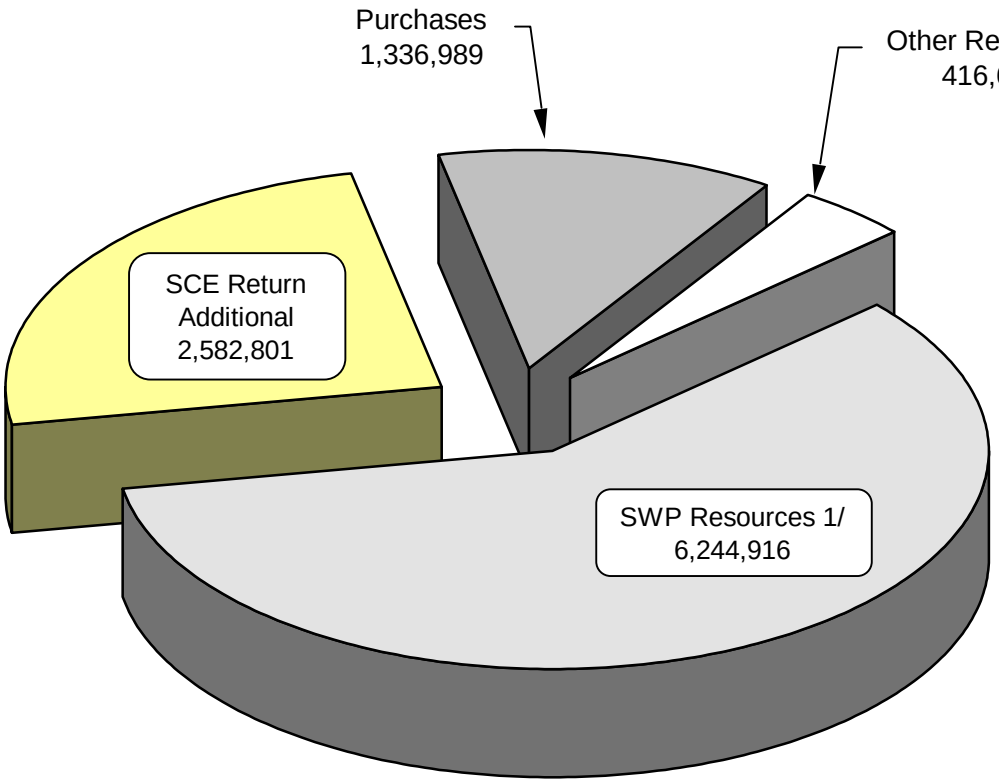
Total: 6,244,916

Note: Purchases, Other Sources, and SCE Return Additional are not shown here. All values are metered readings at plants and are not adjusted for transmission losses.

Figure 4. Total Energy Resources

(all values in MWh)

1997



Total: 10,581,363

1/ See Figure 3 for a breakdown of SWP Energy Resources.

Purchases	
Pacific Power and Light	654,831
City of Vernon	134,809
Bonneville Power Authority	105,911
Louis Dreyfus Electric Power	72,905
City of Azusa	53,218
Portland General Electric	44,020
Northern California Power Agency	40,829
British Columbia Hydro	36,281
Pacific Gas and Electric	33,827
City and County of San Francisco	23,202
Puget Sound Power and Light C..	20,773
Noram Energy Services	20,400
Washington Water and Power Co.	18,500
City of Banning	11,280
Southern Energy Marketing Inc.	11,178
Salt River Project	10,821
Enron Power Marketing Inc.	9,837
Sacramento Municipal Utility District	7,080
Southern California Edison	6,604
L. A. Dept. of Water and Power	5,029
Destech West	4,608
Seattle City Light	2,954
Avista Corp.	2,154
Williams Energy Services	1,288
Philadelphia Electric Co.	1,200
Snohomish Public Utility District	950
Nevada Power	900
Powerex	800
Idaho Power Company	400
Aquila Power Corporation	200
City of Sant Clara	200
	1,336,989

Other Resources	
Southern California Edison	201,095
Pacific Gas & Electric	81,720
Aquila Power Corporation	80,000
City of Azusa	20,000
Sacramento Municipal Utility District	19,888
Bonneville Power Authority	12,295
Western Area Mid Pacific	1,659
	416,657

SCE Return Additional	
Total Received from SCE	4,853,935
SCE Hyatt-Thermalito Entitlement	-1,115,312
CEA Energy	-412,500
SCE Devil Canyon Entitlement	-540,786
SCE Alamo Entitlement	-56,407
MWD Hydro Entitlement	-146,129
	2,582,801

Table 3. Total Energy Resources
1997

(in megawatt-hours)

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hyatt-Thermalito 1/	456,211	390,657	138,176	114,525	200,586	258,449	402,518	254,237	129,519	162,086	117,753	103,711	2,728,428
CEA Energy 2/	31,000	35,000	35,000	21,250	35,000	35,000	35,000	35,000	35,000	40,000	40,000	35,250	412,500
Gianelli													
State	4,093	-62	3,801	37,836	53,133	28,980	26,173	28,428	6,029	4,770	492	0	193,673
Federal	3,923	14,781	1,440	26,160	64,898	50,261	27,017	6,798	0	0	0	0	195,278
Total	8,016	14,719	5,241	63,996	118,031	79,241	53,190	35,226	6,029	4,770	492	0	388,951
Warne 3/	18,162	9,748	16,841	33,229	25,769	5,481	1,258	4,297	15,904	24,232	26,988	28,235	210,144
Castaic	26,313	20,160	29,040	53,986	42,744	10,704	1,440	5,640	23,280	36,925	44,880	45,480	340,592
Mojave	0	0	0	1,530	5,655	5,144	6,865	5,183	4,275	2,021	1,271	1,087	33,031
Alamo	0	0	3,662	9,620	7,848	2,159	8,644	8,487	7,250	4,177	2,607	1,953	56,407
Devil Canyon	4,507	0	7,307	62,315	85,711	73,557	86,351	79,313	64,108	39,300	19,877	18,440	540,786
MWD Hydro	7,630	6,035	8,108	14,935	15,904	18,348	15,730	13,248	12,999	13,119	10,464	9,609	146,129
Reid Gardner	102,817	76,555	300	0	0	27,910	85,514	87,296	125,680	107,291	101,379	100,259	815,001
Pine Flat	83,710	103,394	78,486	56,533	113,858	122,073	116,287	70,074	21,715	2,095	0	0	768,225
Purchases 4/	48,320	45,495	62,430	168,154	136,788	197,596	157,233	151,825	114,956	136,920	48,125	69,147	1,336,989
Other Sources/Exchang 5/	890	1,238	10,615	33,414	33,184	28,685	15,120	33,395	21,773	34,013	74,249	130,081	416,657
SCE Return Additional	82,222	48,046	255,441	246,918	177,963	66,466	184,170	341,064	391,806	163,972	306,374	318,359	2,582,801

1/ Includes Table Mountain and Hyatt out adjusted to Tesla.

2/ Capacity Exchange Agreement energy from SWP system to Southern California Edison.

3/ Includes station-service energy.

4/ Includes Salt River Project, City & County of San Francisco, Southern California Edison, Bonneville Power Authority, Pacific Gas and Electric, Portland General Electric, City of Banning, Pacific Power & LIght, Enron Power Marketing Inc., Louis Dreyfus Electric Power, B.C. Hydro, Puget Sound Power and Light, City of Azusa, L.A. Dept. of Water & Power, Noram Energy Services, Washington Water and Power Co., Northern California Power Agency, Nevada Power, Southern Energy Marketing Inc., Sacramento Municipal Utility District, Destech West, Avista Corp., Williams Energy Services, Philadelphia Electric Co., Seattle City Light, Snohomish Public Utility District, Powerex, Idaho Power Company, Aquila Power Corp., City of Santa Clara, and City of Vernon.

5/ Includes Southern California Edison, Bonneville Power Authority, Aquila Power Corp., City of Azusa, Sacramento Municipal Utility District, Pacific Gas and Electric, and Western Area Mid-Pacific.

Total State:	10,581,363
Total Federal:	195,278
Total Energy Resources:	10,776,641

Table 4. Total Energy Loads

1997

(in megawatt hours)

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hyatt-Thermalito 1/	24	17	19,596	47,712	26,569	31,443	6,573	45,106	46,467	20,114	17,824	22,952	284,397
North Bay 2/	547	519	504	590	1,632	1,748	1,929	1,983	1,235	1,208	1,108	949	13,952
South Bay	2,449	4,118	8,332	7,483	10,918	10,252	13,824	13,509	6,829	4,947	6,482	5,617	94,760
Del Valle	7	6	6	6	40	171	42	8	7	7	47	7	354
Banks													
State	13,052	8,605	36,487	28,433	22,489	43,643	86,917	71,962	83,759	64,033	83,682	118,880	661,942
Federal	0	17,075	9,207	0	0	0	4,752	1,188	12,398	7,965	0	0	52,585
Bottle Rock 3/	61	54	55	59	33	32	38	40	41	34	15	18	480
Gianelli													
State	983	132	2,597	255	244	3,803	975	17,678	36,422	31,209	49,883	94,404	238,585
Federal	56,509	16,719	22,287	9,485	0	0	0	2,776	18,657	40,724	50,943	67,559	285,659
Dos Amigos													
State	5,676	3,784	17,037	31,371	37,635	36,848	59,221	46,463	20,706	16,378	15,858	16,123	307,100
Federal	4,502	11,284	22,869	15,234	23,418	38,682	23,037	14,610	5,450	4,848	3,672	4,014	171,620
Pine Flat 3/	38	0	0	0	21	0	0	0	0	179	221	247	706
Las Perillas	35	77	472	850	1,277	1,505	1,620	1,240	598	597	226	338	8,835
Badger Hill	26	145	1,282	2,383	3,552	4,144	4,483	3,406	1,580	1,596	541	820	23,957
Devil's Den	51	47	52	66	64	360	185	754	1,174	1,570	1,288	1,515	7,127
Bluestone	41	42	50	56	57	362	177	734	1,181	1,514	1,217	1,422	6,853
Polonio	39	38	41	46	44	345	165	742	1,170	1,584	1,311	1,542	7,067
Buena Vista	9,763	6,181	20,855	38,436	37,499	29,319	32,588	28,471	24,731	19,861	17,939	16,427	282,069
Teerink	10,544	5,415	19,023	39,295	36,745	25,650	28,388	26,488	25,834	20,927	19,452	18,032	275,793
Chrisman	23,480	11,813	42,276	88,203	80,785	54,928	61,640	59,002	58,388	46,981	44,530	41,539	613,566
Edmonston	83,272	41,205	150,014	315,055	287,036	191,224	215,487	205,851	205,972	168,476	158,802	149,615	2,172,010
Oso	7,867	4,927	7,882	15,396	11,875	3,105	724	2,392	7,032	10,539	12,761	13,097	97,598
Mojave	68	58	52	47	4	2	2	4	9	36	46	59	387
Pearblossom	3,181	483	20,102	49,315	48,635	40,337	52,746	47,004	37,791	20,090	13,548	11,476	344,708
Warne 3/	66	92	91	56	77	115	142	121	82	39	28	29	938
Sales	647,086	604,089	258,696	121,209	261,275	340,548	500,624	422,480	291,608	253,509	234,617	186,311	4,122,052
Other Project													
Loads 4/	41,034	32,639	33,378	48,681	46,698	39,404	45,836	95,304	97,712	64,787	90,658	129,898	766,029
Actual Deviation	91	946	150	352	754	354	314	1,098	502	910	360	1,040	6,871
Losses	15,522	11,196	11,788	19,925	21,880	24,195	29,252	26,242	23,123	17,593	17,823	24,688	243,227

1/ Pumpback and Station Service

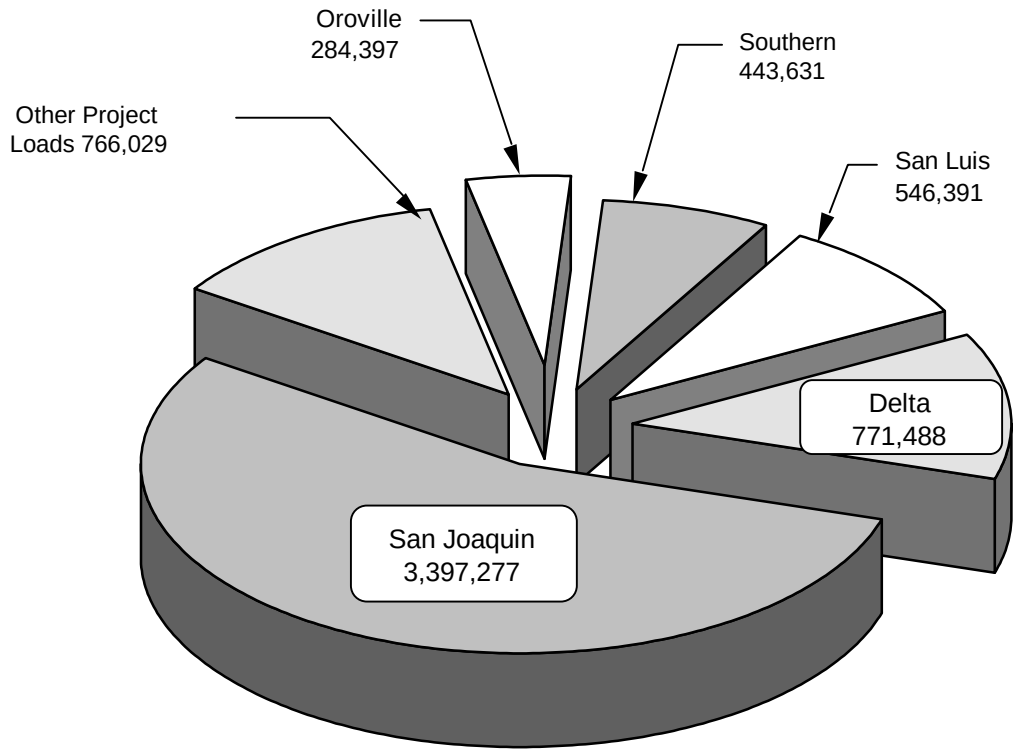
2/ Includes Barker Slough, Cordelia, and Cordelia Interim Pumping Plants.

3/ Station Service only.

4/ Includes Southern California Edison, City of Azusa, LG&E Power Marketing, Inc., Bonnevile Power Authority, Nevada Power Authority, Aquila Power Corporation, Sacramento Municipal Utility District, Pacific Gas and Electric, and Project Emergency Service.

Total State:	10,581,363
Total Federal:	509,864
Total Loads:	11,091,227

Figure 5. SWP Energy Loads
1997
(all values in MWh)



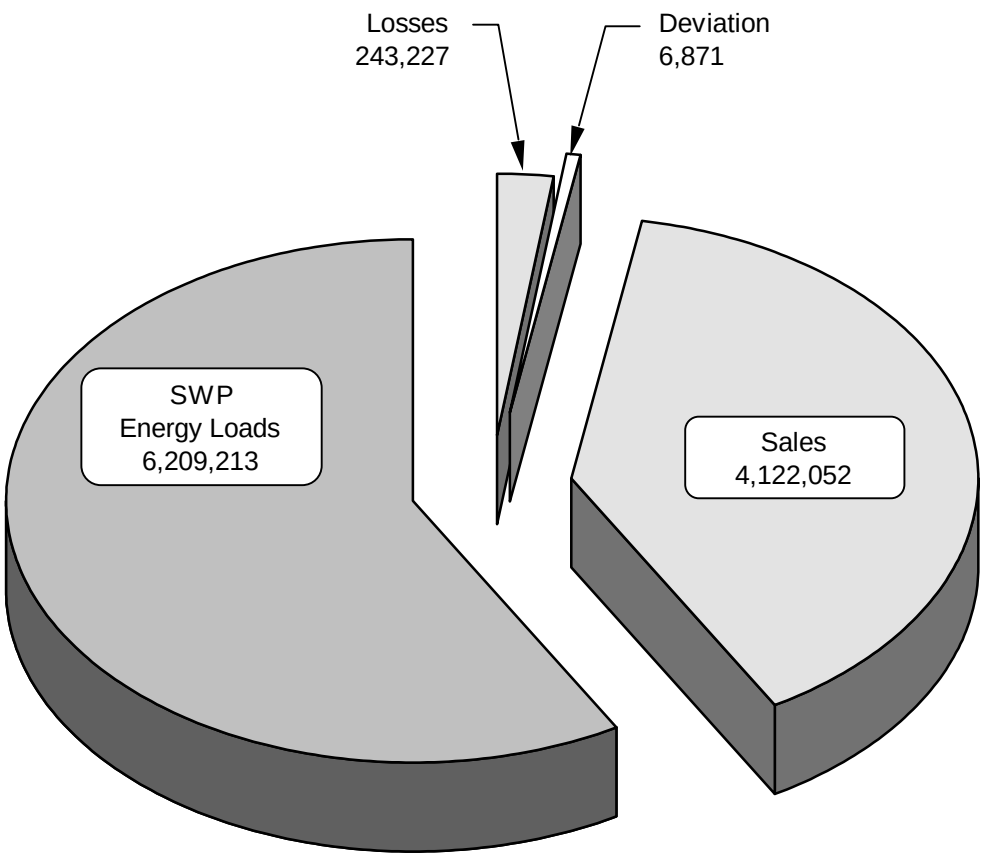
Total: 6,209,213

Oroville Field Division	
Hyatt-Thermalito Complex (Pumpback and Station Service)	284,397
	284,397
Delta Field Division	
North Bay	13,952
South Bay	94,760
Del Valle	354
Banks	661,942
Bottle Rock (Station Service)	480
	771,488
San Luis Field Division	
Gianelli	238,585
Dos Amigos	307,100
Pine Flat (Station Service)	706
	546,391
San Joaquin Field Division	
Las Perillas	8,835
Badger Hill	23,957
Devil's Den	7,127
Bluestone	6,853
Polonio	7,067
Buena Vista	282,069
Teerink	275,793
Chrisman	613,566
Edmonston	2,172,010
	3,397,277
Southern Field Division	
Oso	97,598
Mojave (Station Service)	387
Pearblossom	344,708
Warne (Station Service)	938
	443,631
Other SWP Energy Loads	
Southern California Edison	416,026
LG&E Power Marketing Inc.	123,216
Nevada Power Authority	103,837
Pacific Gas and Electric	35,549
South Bay Emergency Service	34,936
City of Azusa	19,820
Sacramento Municipal Utility District	19,300
Bonneville Power Authority	12,145
Aquila Power Corporation	1,200
	766,029

Figure 6. Total State Energy Loads

1997

(all values in MWh)



Total: 10,581,363

Note: See Figure 5 for breakdown of SWP Energy Loads.

Sales	
Southern California Edison	620,141
Nevada Power	368,028
Pacific Power & Light	332,792
Pacific Gas and Electric	316,800
City of Vernon	315,675
Sacramento Municiple Utility District	304,649
Northern California Power Agency	202,802
Salt River Project	201,598
City of Riverside	176,792
Metropolitan Water District	146,858
Modest Irrigation District	133,517
L.A. Department of Water & Power	126,057
City and County of San Francisco	120,424
San Diego Gas and Electric	88,166
Koch Power Services, Inc.	83,705
City of Glendale	77,154
City of Azusa	63,646
City of Pasadena	45,543
U. S. Gen Po	44,800
Electric Clearing House, Inc.	39,040
Noram Energy Services, Inc.	36,570
Arizona Public Service Co.	33,802
Puget Sound Power & Light	29,713
Western Area Mid Pacific	28,676
City of Anaheim	27,309
L G & E Power Marketing Inc.	24,000
City of Colton	23,813
Enron Power Marketing, Inc.	21,414
Portland General Electric	18,598
City of Redding	12,578
City of Santa Clara	11,338
City of Banning	11,280
SCANA Energy Marketing, Inc.	9,868
Edison Source	7,040
City of Burbank	5,012
Citizens Lehman Power Sales	4,610
Destec Power Services, Inc.	3,669
Bonneville Pwer Administration	2,348
Sonat Power Marketing	550
Lassen Municipal Utility District	532
Aquila Power Corporation	400
The Power Company of America, LP	400
Turlock Irrigation District	295
Avista Energy, Inc.	50
	4,122,052

Sacramento - San Joaquin Delta Operations

The Sacramento-San Joaquin Delta provides an estimated one-half of the State's water supply. In addition, the Delta is an estuary, a constantly changing area where tidal and river currents meet, and where salinity is between the extremes of brackish and fresh waters. The estuary provides habitat for fish and wildlife, including waterfowl on the Pacific Flyway.

Many of the problems facing the Delta today, such as saltwater intrusion and oxidation of peat soil, have plagued the area for many years. Originally a tidal marshland covered with tulles, the Delta, during dry summer months, has been subject to intrusions of salty ocean water from the San Francisco Bay.

Today, dams upstream of the Delta, including SWP's Oroville Dam and CVP's Shasta Dam, help control the intrusion of salt water by releasing fresh water into the Delta during dry periods in summertime. However, problems with salinity in the Delta still exist

With assistance from urban, agricultural, and environmental interests, and other stakeholders concerned with Bay-Delta issues, State and federal agencies developed the Bay Delta Accord. The Accord grew out of Governor Wilson's 1992 policy to "fix the Delta." This led to events that shaped the State-Federal Framework Agreement, signed in June 1994, and the Bay-Delta Accord signed December 15, 1994. *Bulletin 132*-95, *Chapter 1*, explains both the State-Federal Framework Agreement and the Bay-Delta Accord in detail.

Net Delta Outflow Index

Delta outflow is not measured directly due to the major tidal influence in the Delta. Instead an index of Delta outflow is calculated using measured inflows, exports, and estimated in-Delta water use. A new method of calculating Delta outflow was introduced in the 1995 Principles for Agreement on Bay-Delta Standards. This new index, the Net Delta Outflow Index, considers inflows of the Yolo Bypass system, the eastside stream system (the Mokelomne, Cosumnes, and Calaveras rivers), San Joaquin River at Vernalis, and Sacramento Regional Wastewater Treatment Plant. Major Delta exports and the estimated in-Delta water use are deducted from the cumulative inflow total to produce the index. The NDOI became effective for use in Delta standards compliance on January 1, 1995. Table 5 shows the computed daily NDOI for 1997.

The NDOI calculated flows cannot be directly compared to the prior Delta Outflow Index, as the Sacramento River bypass flows and several eastside stream flows were not included in the earlier DOI calculations. Those flows can be quite substantial during high flow periods. In 1997, the Yolo Bypass flows contributed 22 percent of total Delta inflow and, during the extremely high flow events of March, contributed over 60 percent of inflow. A comparison of Delta Inflow and NDOI is plotted on Figure 7. Gross channel depletion is the sum of evapotranspiration and net increase in soil moisture of Delta lands plus evaporation from Delta channels.

The 1997 daily NDOI averaged 42,799 cfs for the year and was 3,211 cfs more than the 1996 daily average. The greatest mean monthly NDOI occurred in January at 277,983 cfs and the greatest mean daily was 622,184 cfs on January 5. The lowest monthly NDOI occurred in October (3,820 cfs) and the year's lowest daily NDOI was on October 29 with 1,976 cfs.

All daily NDOI values are summarized in Table 6. D-1485 standards set a minimum NDOI at Chipps Island for adequate water for fisheries. All NDOI and river flow standards were met in 1997.

Table 5. Net Delta Outflow Index
1997

(in cfs-days except as noted)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	236,330	225,988	66,459	17,131	12,601	9,053	8,826	8,072	5,028	4,039	4,211	22,191
2	349,800	210,964	65,603	16,444	13,039	8,342	8,592	8,086	5,007	4,013	3,985	17,826
3	598,967	199,472	62,855	15,243	12,337	7,882	8,495	8,411	4,992	4,085	4,424	22,714
4	609,189	189,497	62,382	15,686	12,031	8,932	8,462	7,911	7,039	4,025	3,933	21,146
5	622,184	179,317	58,885	13,672	12,166	9,178	8,136	7,819	5,354	3,783	3,434	20,569
6	518,709	169,220	56,191	11,317	12,328	9,082	8,885	7,617	4,720	3,987	4,098	13,840
7	417,188	162,199	49,696	11,329	12,152	10,668	8,688	9,636	4,823	4,301	3,961	14,133
8	365,416	154,581	44,383	11,169	11,226	10,864	9,008	9,215	4,540	4,736	5,198	19,448
9	337,399	145,554	40,133	9,440	11,514	9,399	10,197	12,622	4,710	4,163	5,021	24,139
10	303,183	139,061	38,475	9,526	11,708	8,691	11,214	13,699	4,383	5,335	4,543	26,738
11	269,002	132,161	36,018	9,925	12,441	8,139	11,125	13,862	4,488	6,053	6,723	25,722
12	235,793	123,756	33,777	8,345	12,659	7,102	11,409	12,542	4,022	6,838	9,135	21,305
13	210,308	113,370	30,909	8,255	12,920	7,568	10,748	11,999	3,307	7,200	9,087	14,485
14	185,485	104,604	27,892	9,238	12,659	8,345	12,435	11,145	3,324	5,618	13,535	11,681
15	171,675	99,862	25,969	13,253	12,900	7,489	10,904	9,755	2,905	3,979	15,951	14,830
16	165,243	93,843	24,022	12,800	12,469	8,278	10,324	6,700	3,484	3,803	14,578	15,649
17	159,356	88,070	23,755	12,562	12,130	8,871	10,243	7,792	2,039	3,992	13,982	18,389
18	151,699	82,812	23,828	13,102	10,245	8,852	9,577	8,250	2,641	4,905	12,037	22,309
19	144,506	78,149	23,795	15,532	11,326	9,113	8,976	8,147	3,259	4,809	8,221	20,678
20	137,573	75,253	26,883	16,769	11,815	8,550	8,932	7,948	2,687	4,878	9,548	13,782
21	131,835	72,692	26,934	17,179	12,057	8,083	9,029	7,267	2,747	5,517	7,854	13,487
22	127,596	74,861	25,021	18,773	11,531	7,413	9,811	5,955	2,765	5,966	8,068	13,532
23	157,849	74,518	22,814	20,397	12,112	7,632	9,224	5,447	5,329	6,091	8,608	11,241
24	220,363	74,400	21,361	18,601	14,336	7,261	10,185	6,402	5,069	5,988	7,954	8,324
25	232,139	71,525	21,534	18,787	12,061	6,691	9,025	7,386	4,757	5,495	7,680	7,099
26	246,537	68,610	21,193	17,018	11,819	7,066	9,107	8,574	2,096	4,903	9,899	6,378
27	280,896	67,641	20,059	16,041	12,012	8,122	8,559	8,021	2,099	4,628	15,313	5,842
28	268,061	66,465	18,693	14,458	11,844	7,674	8,509	7,689	2,663	4,662	20,264	5,395
29	259,072		18,412	13,030	9,897	7,625	8,435	6,239	1,976	5,042	23,948	4,874
30	257,402		14,655	13,139	9,659	8,212	8,274	5,664	2,361	4,884	23,856	4,509
31	246,715		15,267		9,197		8,190	5,221		4,010		4,025
Total	8,617,470	3,338,445	1,047,853	418,161	369,191	250,177	293,524	265,093	114,614	151,728	289,049	466,280
Ave.	277,983	119,230	33,802	13,939	11,909	8,339	9,469	8,551	3,820	4,894	9,635	15,041
Max.	622,184	225,988	66,459	20,397	14,336	10,864	12,435	13,862	7,039	7,200	23,948	26,738
Min.	127,596	66,465	14,655	8,255	9,197	6,691	8,136	5,221	1,976	3,783	3,434	4,025
Total In AF	17,092,752	6,621,806	2,078,416	829,422	732,290	496,226	582,205	525,812	227,337	300,952	573,329	924,866

Annual Total = 30,985,414 acre-feet

Table 6. Sacramento Basin and Sacramento-San Joaquin Delta Operations
1997

(in thousands of acre-feet except as noted)

Month	Upstream Reservoir Releases to River			Sacramento River Accretions or Depletions 2/	Delta Inflow				Net Delta Consumptive Use	Delta Exports					Net Delta Outflow Index
	Keswick 1/	Oroville 1/	Nimbus		Sacramento River at Sacramento 3/	Miscellaneous Inflows 4/	San Joaquin River at Vernalis	Total Inflow		Clifton Court Forebay Intake	Barker Slough Pumping Plant	Tracy Pumping Plant	Contra Costa Pumping Plant	Total Exports	
Jan	2,564	2,674	2,005	6,358	5,388	9,585	2,007	16,980	-281	39	1	124	4	168	17,093.3
Feb	951	941	402	2,118	3,293	1,699	1,793	6,785	33	94	1	31	4	130	6,622.3
Mar	326	241	257	731	1,556	187	842	2,585	73	158	1	267	7	433	2,078.5
Apr	350	79	156	245	830	100	261	1,191	81	107	2	162	10	281	829.4
May	571	108	154	-129	703	80	288	1,071	131	84	5	107	12	208	731.8
Jun	739	209	159	-204	903	72	173	1,148	210	160	6	264	12	442	495.6
Jul	910	456	141	-220	1,287	58	116	1,461	262	327	6	270	14	617	582.2
Aug	743	295	123	9	1,170	41	104	1,315	224	275	6	272	12	565	526.2
Sep	495	125	95	136	851	31	116	998	153	345	4	257	12	618	227.3
Oct	309	196	149	106	759	24	157	940	96	266	3	264	10	543	300.8
Nov	271	139	143	317	870	30	127	1,027	-99	292	3	250	8	553	573.2
Dec	259	111	148	878	1,396	51	125	1,572	-32	420	2	251	6	679	924.5
Total	8,487	5,573	3,932	10,345	19,006	11,958	6,109	37,073	851	2,567	40	2,519	111	5,237	30,985.1

1/ Time lagged values (Keswick: 5 days; Oroville: 2 days).

2/ Positive values are accretions; negative values are depletions.

3/ These values are based on a measured daily average taken from the Sacramento River at Freeport and include Sacramento County Regional Waste Treatment Plant.

4/ Includes Yolo Bypass, Eastside Streams, and Miscellaneous Inflows.

Figure 7. Delta Tide, Inflow, and Net Delta Outflow Index
1997

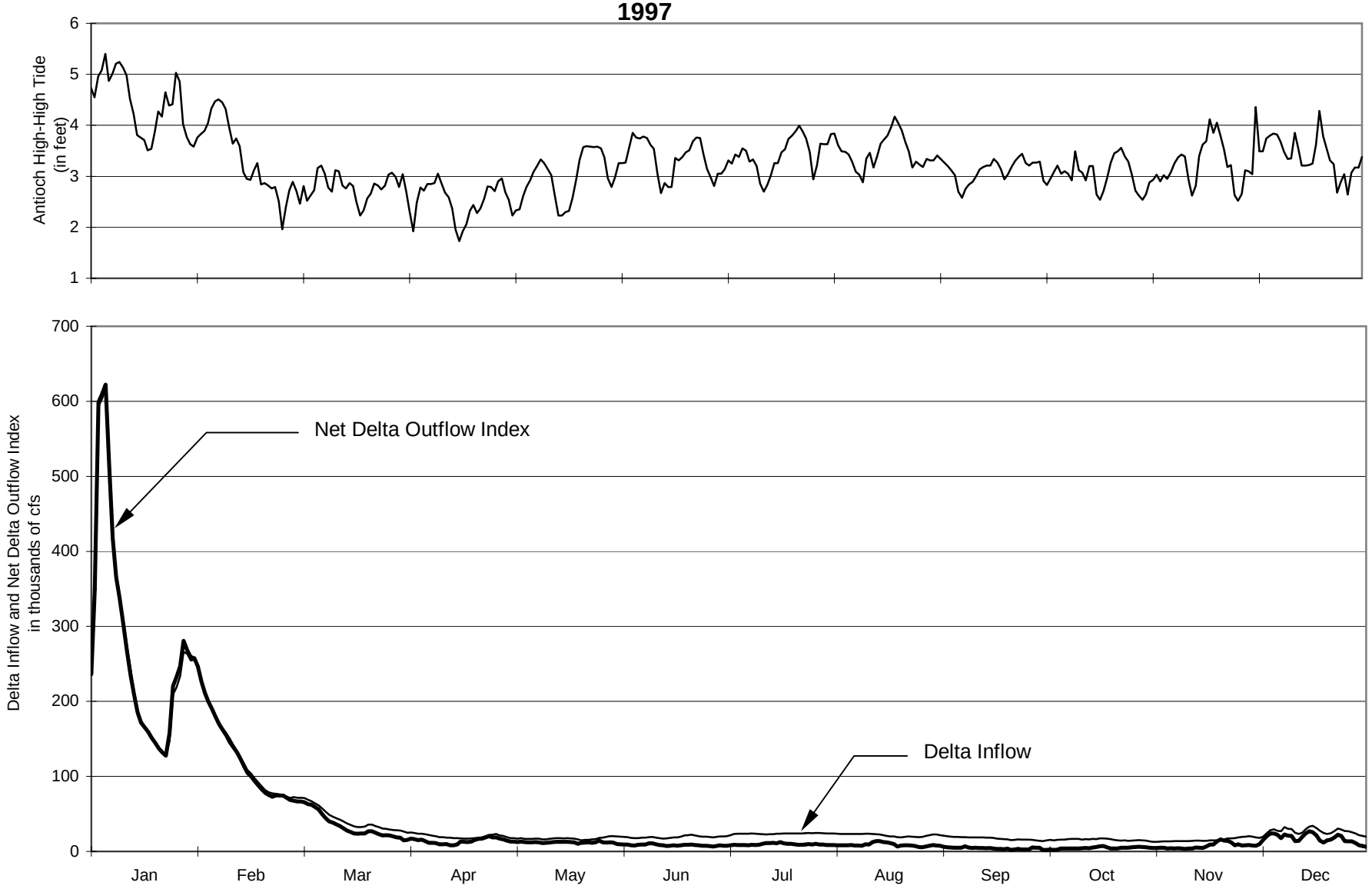
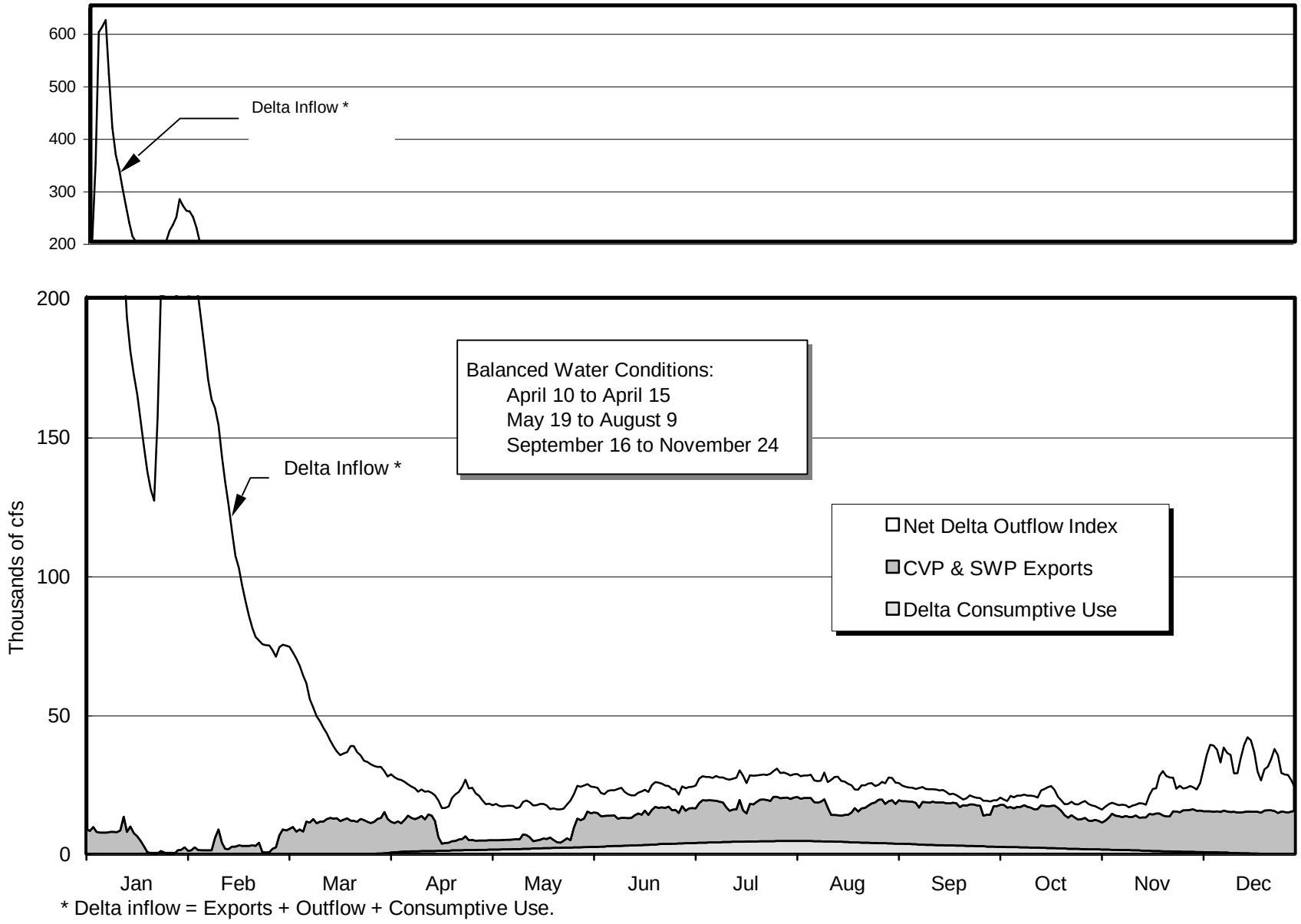


Figure 8. Coordinated Delta Operations
1997



* Delta inflow = Exports + Outflow + Consumptive Use.

Figure 9. Coordinated Delta Operations
Lagged Storage Withdrawals
1997

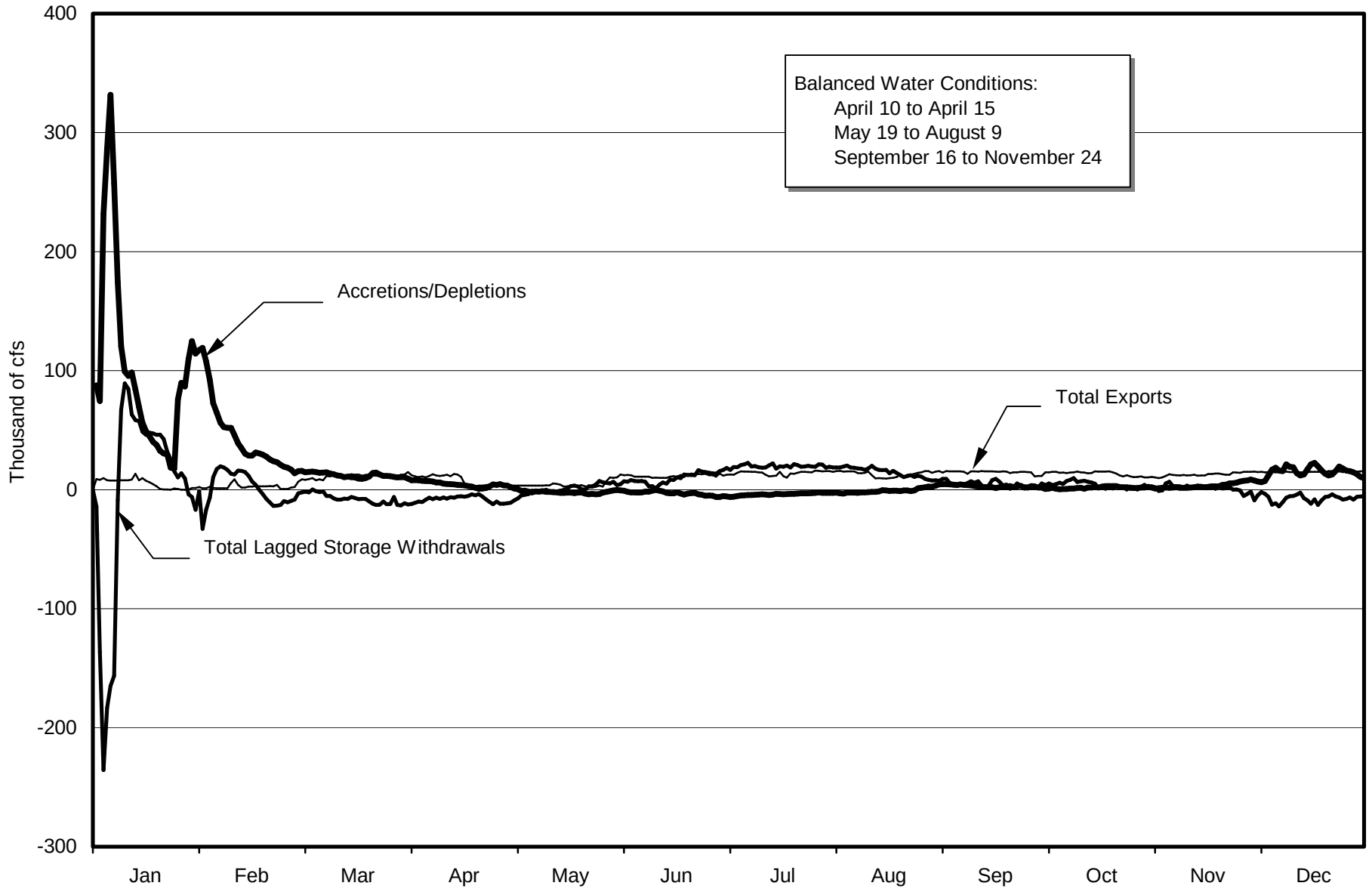
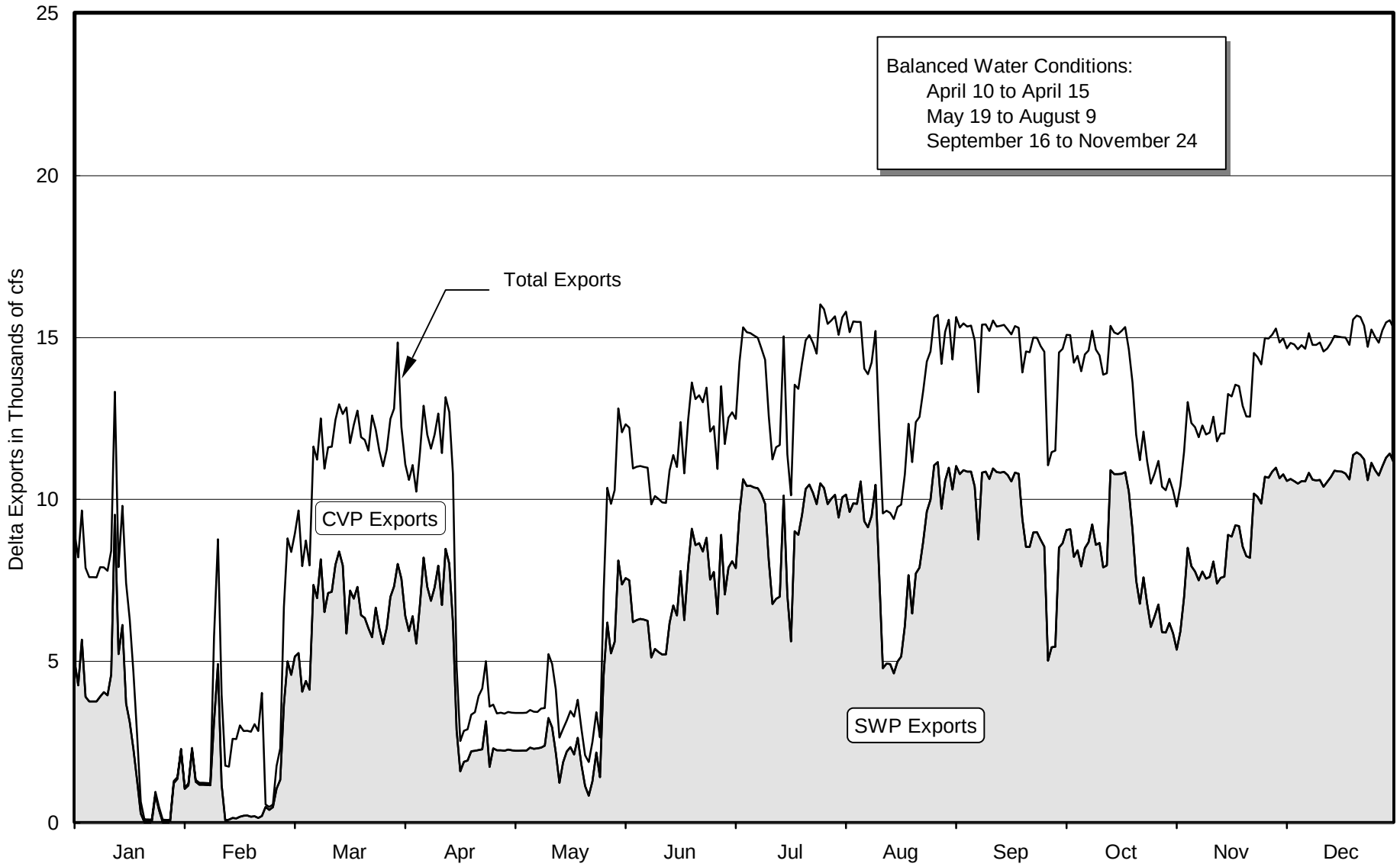


Figure 10. Coordinated Delta Operations
Delta Exports
1997



Project Operations by Field Division

Oroville Field Division

Water Storage

SWP water storage facilities in the Oroville Field Division include Lake Oroville, Thermalito Forebay and Afterbay (Oroville-Thermalito Complex) and upper Feather River reservoirs consisting of Lake Davis, Frenchman Lake, and Antelope Lake. Lake Oroville operations store winter and spring runoff for later SWP use for power generation, flood control, recreation, fish and wildlife enhancement, in addition to water supply.

The Upper Feather River Reservoirs have a combined capacity of 162,000 AF. Monthly operations for the three Upper Feather River reservoirs are presented in Table 7. The table below compares storage capacity with the largest end-of-month storage for each reservoir for the last five years:

	Reservoir (Capacity)		
	Antelope	Frenchman	Davis
Year	22,566	55,477	84,371
1997	(Mar) 23,637	(Mar) 56,238	(Jan) 78,840
1996	(Dec) 23,944	(Mar) 57,881	(May) 81,858
1995	(Apr) 25,242	(Apr) 58,172	(May) 84,331
1994	(May) 19,686	(Mar) 32,770	(Apr) 63,089
1993	(Apr) 23,895	(May) 39,814	(Jun) 68,908

The total amount of unimpaired runoff to Lake Oroville for the 1996-97 water year totaled about 6.70 MAF, (145 percent of average). Lake Oroville storage at the beginning of 1997 was 2,909,103 AF (91 percent of normal maximum operating capacity). Storage peaked on January 2, 1997, at 3,332,838 AF, (94 percent of normal maximum operating capacity). Lowest storage in Lake Oroville in 1997 was 2,002,239 AF (57 percent of normal maximum operating capacity) on November 21. By December 31, 1997, storage was at 2,224,172 AF, (63 percent of normal maximum operating capacity).

Lake Oroville's computed inflow is tabulated in Table 8 and plotted along with releases, diversions, and storage withdrawals on Figure 11. A ten-year historical summary of Lake Oroville's storage and inflow is illustrated on Figure 12.

Water temperatures on and below the lake's surface are monitored very closely throughout the year at various locations around the lake. Two intakes to the powerplant have shutters that control the depth from which water enters the plant. The temperature of water entering the fish hatchery can then be controlled by adding or removing shutters as necessary. A complete illustration of water temperature and intake operation is shown on Figure 14. Further discussions on water temperature operations are detailed in *"Water Deliveries and Aqueduct Operations."*

Water Deliveries

Project water stored in the Upper Feather Area lakes flows into Lake Oroville through the North and Middle Forks of the Feather River. Contract deliveries totaled 12,821 AF to two agencies. Non-project deliveries (prior water rights) totaling 910 AF were made out of Lake Davis.

Water stored in Lake Oroville is released into the Thermalito Diversion Dam Pool, from which specified quantities are released into both the Feather River and the Thermalito Power Canal. The power canal supplies water first to the Thermalito Forebay and then to Thermalito Afterbay. From the Thermalito Afterbay, additional water is released to the Feather River and several local distribution systems used to deliver water to prior water right holders. These deliveries are collectively called the Feather River Service Area diversions. FRSA diversions are not considered SWP benefits, as they predate the SWP construction, and would have occurred in the absence of the SWP to the limit of available natural river flows. Nearly all FRSA diversions are for agricultural use and totaled 978,891 AF in 1997, 57,911 AF more than in 1996. All FRSA diversions are detailed below:

Sutter Butte Canal	531,440
Richvale Canal	135,770
Sunset Pumps	10,401
Western Canal Lateral	3,855
Western Canal	261,570
Tudor Mutual	4,500
Garden Highway	14,324
Plumas Mutual	8,282
Lake Davis	910
Oswald Water District	1,258
Palermo Canal	7,514
Total in AF	**979,801**

Table 7. Upper Feather Area Lakes Monthly Operation
1997

(in acre-feet except as noted)

Month	Lake Storage			Outflow							Inflow
				Regulated Release							
	Water Surface Elevation (in feet)	End of Month Storage	Storage Change	Stream-Flow Maint.	Water Supply Contract	Prior Water Rights	Total Regulated Release	Spill	Estimated Evaporation and Seepage	Total Outflow	Computed
Antelope Lake			**Capacity 22,566 acre-feet**								
Jan	5002.81	23,324	-619	1,230	0	0	1,230	18,873	67	20,170	19,551
Feb	5002.64	23,163	-161	1,111	0	0	1,111	4,191	76	5,378	5,217
Mar	5003.14	23,637	474	1,230	0	0	1,230	7,763	114	9,107	9,581
Apr	5003.05	23,551	-86	1,190	0	0	1,190	9,037	190	10,417	10,331
May	5002.43	22,965	-586	1,230	0	0	1,230	4,524	302	6,056	5,470
Jun	5002.02	22,583	-382	1,190	0	0	1,190	1,200	467	2,857	2,475
Jul	5001.01	21,656	-927	1,230	0	0	1,230	4	505	1,739	812
Aug	4999.41	20,225	-1,431	1,230	0	0	1,230	0	586	1,816	385
Sep	4998.03	19,039	-1,186	1,190	0	0	1,190	0	396	1,586	400
Oct	4996.95	18,141	-898	1,230	0	0	1,230	0	291	1,521	623
Nov	4996.52	17,790	-351	1,190	0	0	1,190	0	130	1,320	969
Dec	4996.19	17,524	-266	1,230	0	0	1,230	0	89	1,319	1,053
Total	---	---	-6,419	14,481	0	0	14,481	45,592	3,213	63,286	56,867
Frenchman Lake			**Capacity 55,477 acre-feet**								
Jan	5588.26	55,888	7,903	1,993	0	0	1,993	7,313	112	9,418	17,321
Feb	5588.20	55,793	-95	4,108	0	0	4,108	325	111	4,544	4,449
Mar	5588.48	56,238	445	7,268	0	0	7,268	1,204	190	8,662	9,107
Apr	5588.38	56,079	-159	3,485	0	0	3,485	3,275	313	7,073	6,914
May	5587.28	54,345	-1,734	3,548	252	0	3,800	278	520	4,598	2,864
Jun	5585.64	51,827	-2,518	0	2,742	0	2,742	0	802	3,544	1,026
Jul	5583.05	47,999	-3,828	0	3,358	0	3,358	0	889	4,247	419
Aug	5579.49	43,023	-4,976	0	4,199	0	4,199	0	925	5,124	148
Sep	5577.99	41,025	-1,998	0	1,640	0	1,640	0	611	2,251	253
Oct	5577.53	40,424	-601	62	399	0	461	0	457	918	317
Nov	5577.70	40,645	221	179	0	0	179	0	208	387	608
Dec	5577.86	40,855	210	184	0	0	184	0	144	328	538
Total	---	---	-7,130	20,827	12,590	0	33,417	12,395	5,282	51,094	43,964
Lake Davis			**Capacity 84,371 acre-feet**								
Jan	5773.60	78,840	6,268	12,851	1	0	12,852	0	276	13,128	19,396
Feb	5771.07	69,342	-9,498	11,455	1	0	11,456	0	263	11,719	2,221
Mar	5769.81	64,857	-4,485	11,028	1	0	11,029	0	423	11,452	6,967
Apr	5769.21	62,780	-2,077	6,918	2	0	6,920	0	691	7,611	5,534
May	5768.55	60,538	-2,242	3,739	41	12	3,792	0	1,114	4,906	2,664
Jun	5768.10	59,037	-1,501	535	34	60	629	0	1,670	2,299	798
Jul	5767.40	56,744	-2,293	238	63	377	678	0	1,800	2,478	185
Aug	5766.63	54,283	-2,461	362	54	232	648	0	2,005	2,653	192
Sep	5765.57	51,002	-3,281	1,691	27	229	1,947	0	1,403	3,350	69
Oct	5764.47	47,719	-3,283	2,549	6	0	2,555	0	866	3,421	138
Nov	5764.68	48,336	617	298	1	0	299	0	469	768	1,385
Dec	5764.83	48,780	444	472	0	0	472	325	325	1,122	1,566
Total	---	---	-23,792	52,136	231	910	53,277	325	11,305	64,907	41,115

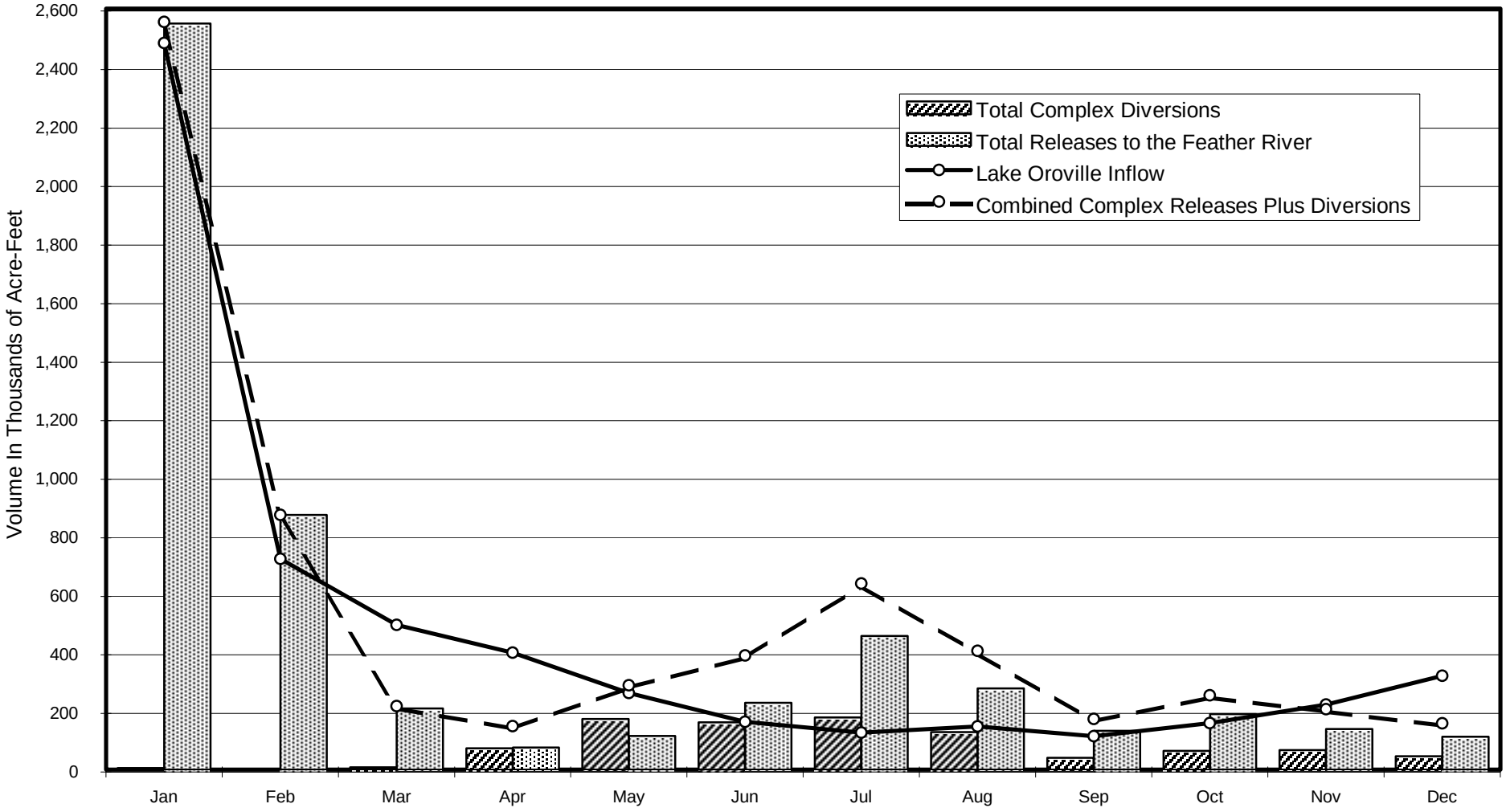
Table 8. Lake Oroville Monthly Operation
1997

(in acre-feet except as noted) Capacity 3,537,577 acre-feet

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Outflow						Hyatt Pumpback	Computed Inflow 1/
				Hyatt Generation 1/	Palermo Canal	Spillway Leakage	Evap-oration	Spill	Total Outflow		
Jan	853.83	2,860,051	-69,052	700,899	112	720	862	1,848,385	2,550,978	0	2,481,926
Feb	839.94	2,675,667	-184,384	633,123	113	499	1,844	269,121	904,700	0	720,316
Mar	861.26	2,962,255	286,588	224,762	296	1,343	3,272	38	229,711	21,749	494,550
Apr	879.39	3,222,432	260,177	180,448	723	2,299	4,394	55	187,919	48,574	399,522
May	877.01	3,187,389	-35,043	311,075	1,108	2,775	7,188	73	322,219	25,816	261,360
Jun	861.84	2,970,340	-217,049	400,586	1,080	2,311	7,823	0	411,800	31,448	163,303
Jul	821.33	2,441,723	-528,617	649,831	1,149	1,000	10,116	0	662,096	7,030	126,449
Aug	800.89	2,201,798	-239,925	433,584	1,178	6	8,235	0	443,003	55,579	147,499
Sep	795.35	2,139,728	-62,070	225,879	999	0	7,001	0	233,879	57,270	114,539
Oct	785.47	2,032,123	-107,605	285,107	474	0	4,506	0	290,087	23,841	158,641
Nov	788.24	2,061,894	29,771	212,144	147	0	1,559	0	213,850	21,631	221,990
Dec	802.86	2,224,172	162,278	184,281	136	0	1,475	0	185,892	27,305	320,865
Total	- - -	- - -	-704,931	4,441,719	7,514	10,953	58,275	2,117,672	6,636,133	320,243	5,610,959

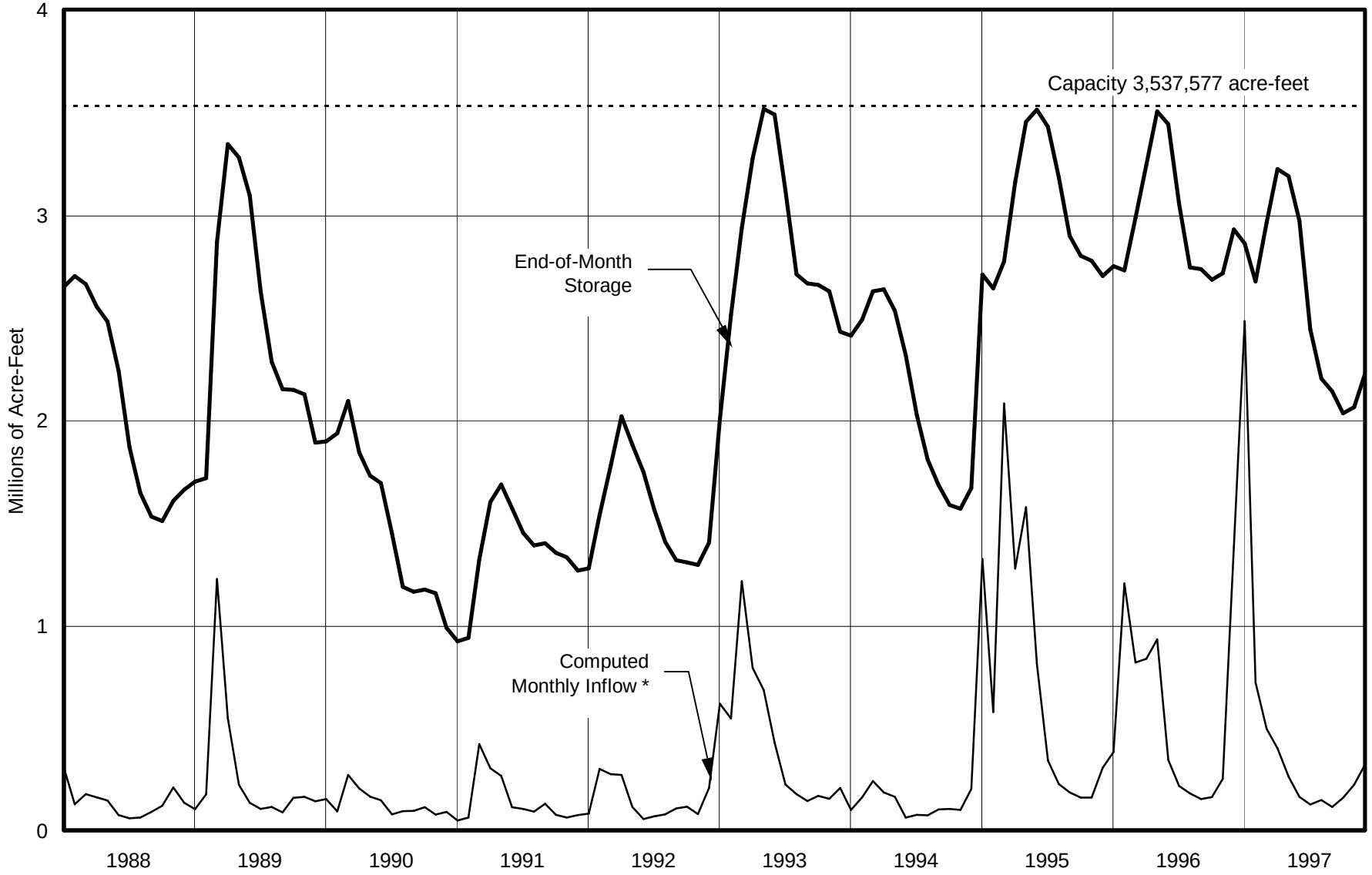
1/ Includes bypass flows.

Figure 11. Oroville-Thermalito Complex
Inflow, Releases, and Diversions
1997



Note: Releases include flows at fish barrier dam, fish hatchery, and afterbay river outlet. Diversions include Butte County, Thermalito Irrigation District, Sutter Butte Canal, Western Lateral, Richvale Canal, Sunset Pumps, and Western Canal. The area between the plotted lines above the Inflow line represents amounts derived from storage.

Figure 12. Historical Lake Oroville Operation



* Excludes pumpback.

Figure 13. Operation of Lake Oroville for Flood Control

1996-97

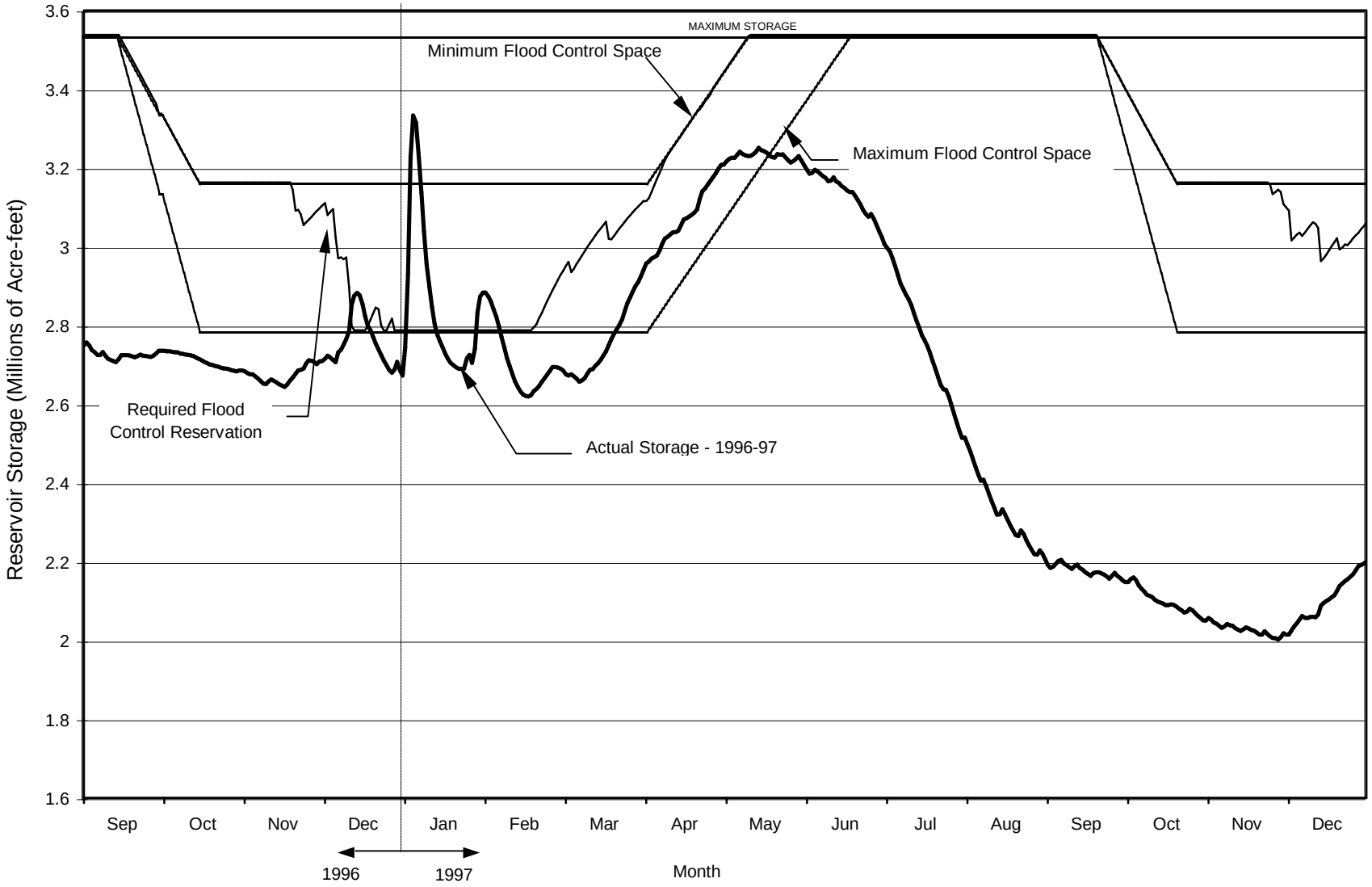
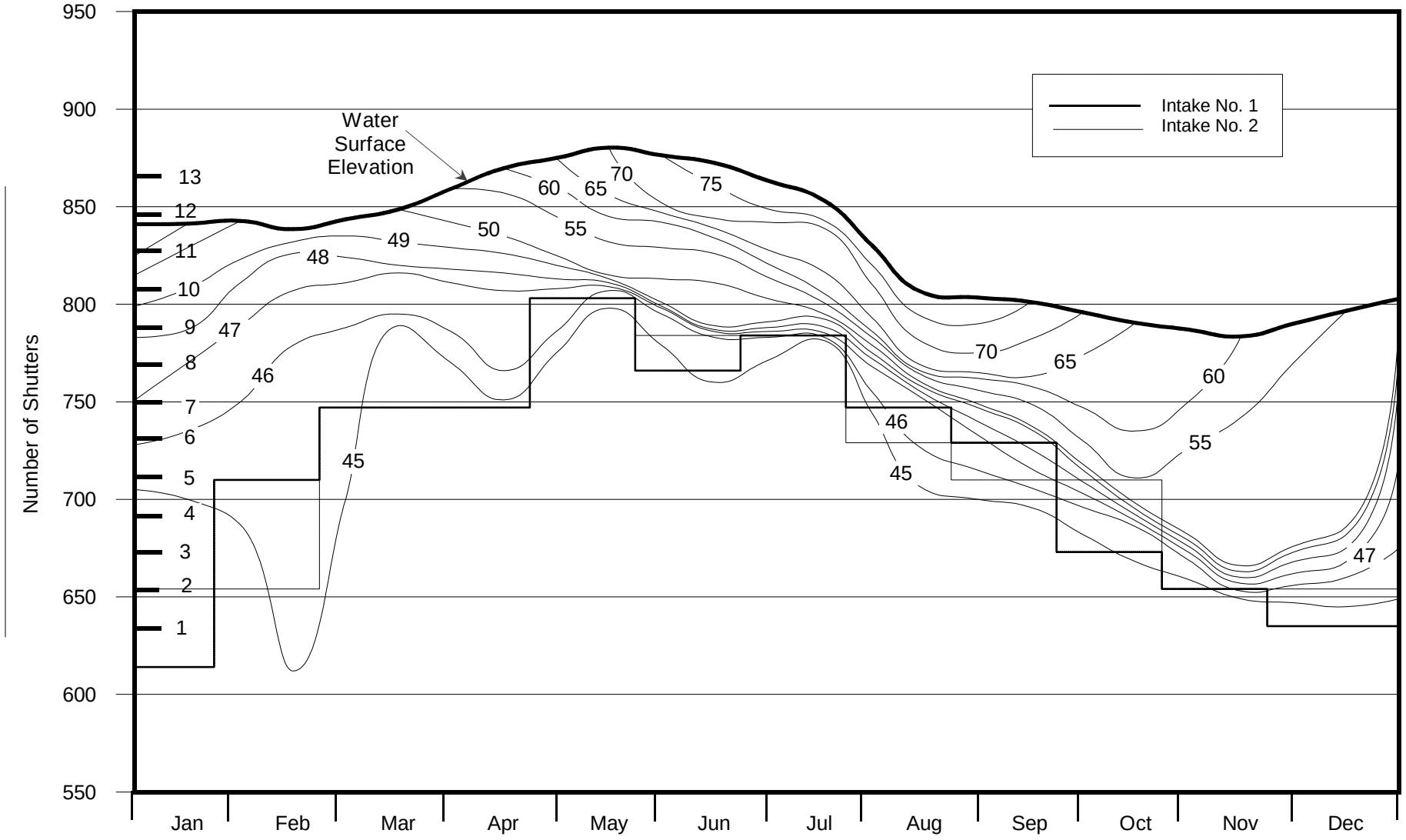


Figure 14. Lake Oroville Temperatures
1997
(isotherms in degrees Farenheit)



Note: Temperature data is taken once per month and averaged for the rest of the year.

Table 9. Thermalito Forebay Monthly Operation
1997

Including Diversion Pool and Power Canal

(end of month storage in acre-feet)

Month	Storage 1/	Storage Change	Inflow			Outflow					Losses (-) And Gains (+)
			Lake Oroville Releases 2/	Kelly Ridge Generation	Thermalito Pumpback	Thermalito Generation 3/	Butte County	Thermalito Irrigation District	Releases To River 4/	Hyatt Powerplant Pumpback	
Jan	22,500	-483	2,550,004	14,480	0	940,599	1	0	1,645,000	0	20,633
Feb	23,272	772	902,743	14,050	0	608,152	1	0	294,212	0	-13,656
Mar	23,864	592	226,143	15,590	27,444	210,665	5	0	39,010	21,749	2,844
Apr	23,261	-603	182,802	12,972	65,325	173,736	1	0	37,044	48,574	-2,348
May	22,159	-1,102	313,923	10,708	39,465	303,544	1	95	38,520	25,816	2,777
Jun	23,497	1,338	402,897	14,325	49,026	399,170	2	193	37,995	31,448	3,896
Jul	23,646	149	650,831	15,340	8,877	637,187	2	410	38,566	7,030	8,294
Aug	24,336	690	433,590	13,265	60,501	417,294	2	362	39,365	55,579	5,934
Sep	23,525	-811	225,879	5,839	70,232	211,492	0	300	37,391	57,270	3,692
Oct	23,670	145	285,107	1,526	37,119	254,259	15	159	47,930	23,841	2,596
Nov	24,455	785	212,001	2,691	31,986	170,456	83	112	55,742	21,631	2,130
Dec	25,294	839	184,154	12,074	41,277	154,998	76	99	57,049	27,305	2,861
Total	- - -	2,311	6,570,074	132,860	431,252	4,481,552	189	1,730	2,367,824	320,243	39,652

1/ Sum of Thermalito Forebay and Diversion Pool.

2/ Sum of releases from Lake Oroville through Hyatt plant, spill, and spillway leakage.

3/ Includes bypass flows.

4/ Sum of Diversion Dam generation plus Hatchery.

Table 10. Thermalito Afterbay Monthly Operation
1997

(end of month storage in acre-feet)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow	Outflow						Losses (-) And Gains (+)
				Thermalito Generation 1/	Sutter Butte Canal	Western Canal Lateral	Richvale Canal	Western Canal	River Outlet	Thermalito Pumpback	
Jan	132.18	39,778	5,808	940,599	2,060	0	3,290	0	904,100	0	-25,341
Feb	130.24	32,954	-6,824	608,152	0	0	0	0	576,318	0	-38,658
Mar	129.82	31,556	-1,398	210,665	8,140	0	0	0	169,700	27,444	-6,779
Apr	128.49	27,319	-4,237	173,736	50,850	603	9,040	12,620	38,650	65,325	-885
May	132.00	39,120	11,801	303,544	93,220	425	20,660	55,250	76,420	39,465	-6,303
Jun	128.67	27,875	-11,245	399,170	86,440	946	21,730	50,550	190,560	49,026	-11,163
Jul	133.29	43,951	16,076	637,187	91,540	932	24,700	57,200	418,442	8,877	-19,420
Aug	128.64	27,782	-16,169	417,294	72,790	448	16,750	36,540	237,802	60,501	-8,632
Sep	129.45	30,348	2,566	211,492	33,180	0	1,650	4,720	95,272	70,232	-3,872
Oct	130.97	35,451	5,103	254,259	36,820	142	12,030	15,150	141,358	37,119	-6,537
Nov	127.75	25,087	-10,364	170,456	31,130	345	13,480	21,960	83,271	31,986	1,352
Dec	131.38	36,891	11,804	154,998	25,270	14	12,440	7,580	55,245	41,277	-1,368
Totals			2,921	4,481,552	531,440	3,855	135,770	261,570	2,987,138	431,252	-127,606

1/ Includes bypass flows.

Delta Field Division

Water Storage

The Delta Field Division consists of the North Bay Aqueduct, the South Bay Aqueduct, and the California Aqueduct from Clifton Court Forebay to Check 12. Along these waterways, water storage operations take place at Clifton Court Forebay, Bethany Reservoir, Travis Tank, Napa Terminal Tank, the California Aqueduct, and Lake Del Valle. Water storage data at the South Bay Aqueduct are not reported; storage changes are assumed to be zero for operational purposes.

Pumping from Lake Del Valle back into the Aqueduct usually occurs in the fall and is detailed in Table 11. Inflow and storage changes for the last ten years at Lake Del Valle are shown on Figure 15.

Project water flows from the Delta into Clifton Court Forebay through the Clifton Court control gates. A schedule of daily gate operation is published in the *SWP Monthly Report of Operations.* Monthly inflows to Clifton Court Forebay along with corresponding storage changes are shown in Table 11.

Water Deliveries

The Delta Field Division delivered 169,635 AF of water in 1997. These and other deliveries are summarized in Table 2.

The North Bay Aqueduct system, completed in May 1988, begins in the North Delta at the Barker Slough Facilities. Sacramento River water is conveyed through Cache, Lindsey, and Barker sloughs to the Barker Slough pumping plant. From the pumping plant, water is conveyed by pipe for 24 miles northwest to contractors in Napa and Solano Counties and to the Cordelia Pumping Plant. Deliveries are made to Solano County water users via turnouts along the pipe's length. From the Cordelia Pumping Plant, the North Bay Aqueduct terminates at the Napa Terminal Tank. The Aqueduct supplied 37,871 AF to Napa and Solano counties.

A division-wide total of 145,295 AF went to SWP entitlement contractors, 23,142 AF of Local Water was conveyed to Alameda County Flood Control and Water Conservation District, Zone 7, and to the Alameda County Water District, 376 AF of Federal Wheeling to Musco Olive and the V. A. Cemetery, 667 AF of General Wheeling to Alameda County Flood Control and Water Conservation District, Zone 7, and 155 AF of Recreation water.

Pumping Plants

Delta Field Division pumping plants include Barker Slough Pumping Plant and Cordelia Pumping Plant on the North Bay Aqueduct, Banks on the California Aqueduct, and South Bay and Del Valle Pumping Plants on the South Bay Aqueduct. Monthly pumping data is summarized for the year in Table 1.

Banks Pumping Plant was originally built to accommodate 11 units. Initially, seven pumps were constructed for a total pumping capacity of 6,400 cfs. Construction of the final four pumps was completed in 1990, each with a design capacity of 1,067 cfs and a new total capacity of 10,500 cfs. Export pumping rates are increased on weekends to take advantage of less costly off-peak electricity. This produces sharp peaks in the export rate at about 7-day intervals.

In 1997, The SWP diverted 2,544,686 AF of water at Banks Pumping Plant, including 201,033 AF of CVP water wheeled by the Department. Below is a five-year summary of federal, State, and total pumping at Banks:

Pumping at Banks Pumping Plant
(in AF)

Year	Federal	State	Total
1997	201,033	2,343,653	2,544,686
1996	210,121	3,031,102	3,241,223
1995	28,417	2,088,462	2,116,879
1994	44,984	1,621,129	1,666,113
1993	196,169	3,013,955	3,210,124

Table 11. Lake Del Valle Monthly Operation

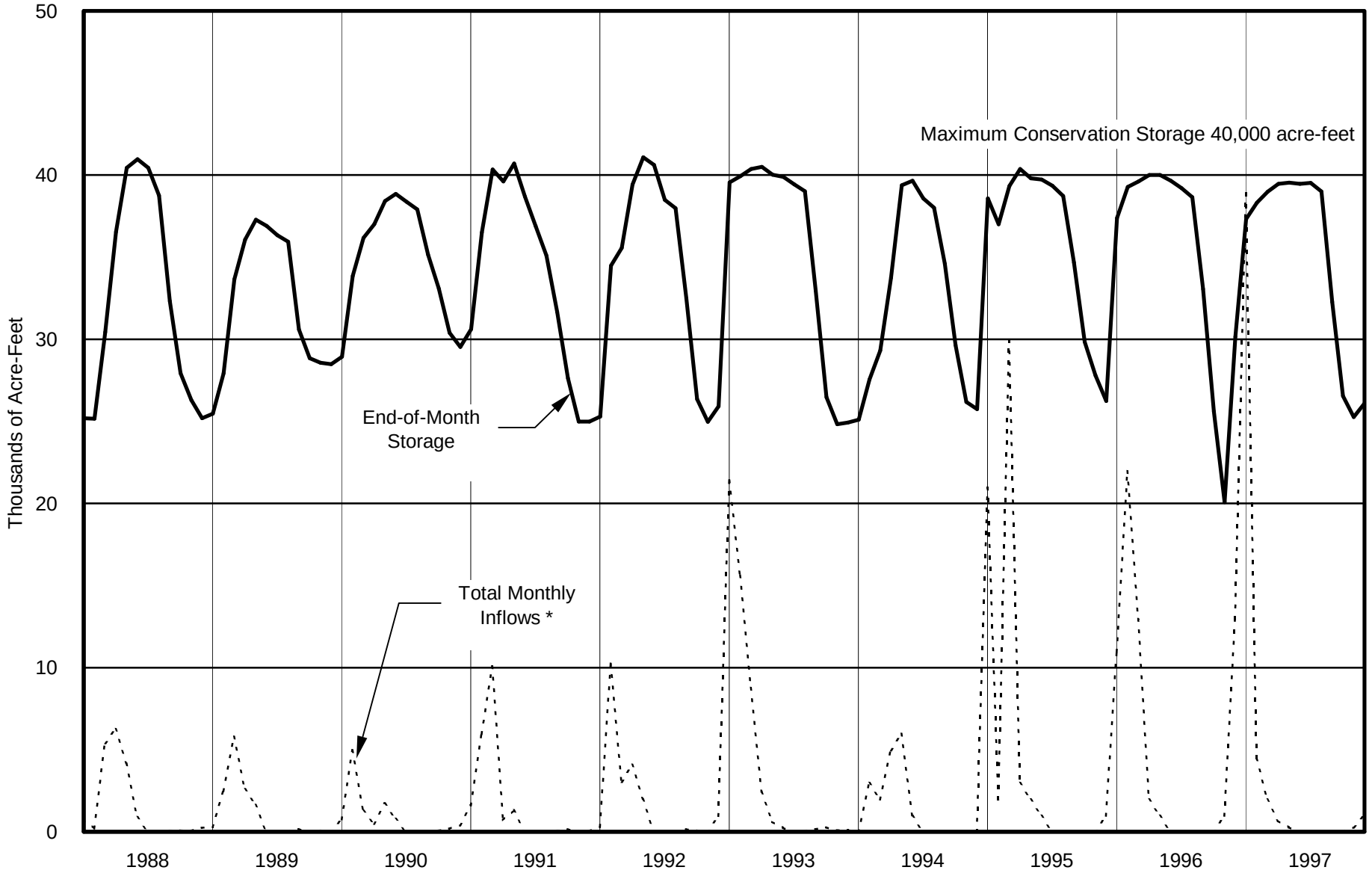
1997

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow		Outflow					Precipitation (inches)
				Natural	South Bay Aqueduct	South Bay Aqueduct	Recreation 1/	Arroyo Valle	Evaporation	Total	
Jan	699.26	37,323	7,162	38,992	0	1,231	0	30,555	44	31,830	4.86
Feb	700.72	38,322	999	4,546	0	2,514	1	928	104	3,547	4.83
Mar	701.68	38,987	665	1,689	0	838	5	0	181	1,024	2.66
Apr	702.37	39,470	483	733	0	0	9	0	241	250	1.52
May	702.46	39,533	63	266	545	381	20	0	347	748	0.93
Jun	702.36	39,463	-70	58	2,312	2,038	24	0	378	2,440	0.00
Jul	702.44	39,519	56	-49	577	0	29	0	443	472	0.00
Aug	701.69	38,994	-525	-107	0	0	23	0	395	418	0.00
Sep	691.46	32,272	-6,722	15	0	6,335	21	0	381	6,737	0.00
Oct	681.45	26,538	-5,734	-223	0	5,284	12	0	215	5,511	0.94
Nov	678.97	25,260	-1,278	258	0	1,462	6	0	68	1,536	3.63
Dec	680.60	26,093	833	1,098	0	203	5	0	57	265	4.54
Total	---	---	-4,068	47,276	3,434	20,286	155	31,483	2,854	54,778	23.91

1/ To East Bay Regional Park District.

Figure 15. Historical Lake Del Valle Operation



* Natural and pumped inflows.

Table 12. Clifton Court Forebay Monthly Operation

1997

(elevation in feet, storage in acre-feet)

Month	Water Surface Elevation	Storage	Storage Change	Inflow
Jan	0.86	20,117	5,427	38,702
Feb	2.90	24,526	4,409	94,773
Mar	0.37	19,060	-5,466	157,235
Apr	-0.50	17,187	-1,873	107,653
May	-0.63	16,907	-280	83,473
Jun	-0.39	17,424	517	159,962
Jul	-0.93	16,262	-1,162	327,093
Aug	-0.07	18,112	1,850	274,639
Sep	0.82	20,030	1,918	344,955
Oct	0.34	18,996	-1,034	265,829
Nov	-0.07	18,112	-884	292,553
Dec	0.29	18,888	776	420,021
Total	- - -	- - -	4,198	2,566,888

San Luis Field Division

Water Storage

San Luis Reservoir reached its maximum end-of-month storage for 1997, 2,009,693 AF (99 percent of maximum operating storage), at the end of March. Maximum operating storage capacity in San Luis is 2,027,835 AF. Minimum end-of-month storage for the year, 396,307 AF (20 percent of maximum operating storage), occurred in August. The State's share of San Luis Reservoir end-of-month storage reached the maximum of 1,097,695 AF in January (103 percent of State's maximum operating storage), and the minimum of 334,549 AF (31 percent of State's maximum operating storage) was reached in August. Table 13 and Figure 16 show San Luis Reservoir operations during 1997. Table 14 shows the monthly operation of O'Neill Forebay during 1997.

There are two different accounting procedures for calculating storage shares in O'Neill Forebay. One adjusts storage shares using actual SWP/USBR deliveries made from water out of O'Neill. The other method adjusts storage shares in O'Neill using amounts pumped at Dos Amigos for each agency derived from scheduled energy. Since scheduled pumping and water deliveries never match, there is always a difference that is carried over into subsequent months. These mismatches are used to "underschedule" or "overschedule" energy and pumping at Dos Amigos in order to bring the mismatch back into alignment or closer to zero.

Pumping and Generating Plants

Total pumping in 1997 at Gianelli Pumping-Generating Plant was 1,774,467 AF. Water released from San Luis Reservoir to O'Neill Forebay for generation was 1,864,695 AF. Total pumping at Dos Amigos Pumping Plant in 1997 was 3,580,709 AF, about 231,547 AF less than was pumped in 1996. Table 15 summarizes joint-use plant activity on a monthly basis. The amounts of storage shares for O'Neill Forebay are calculated using the first of the two methods described in "Water Storage."

Water Deliveries

SWP water deliveries in the San Luis Field Division during 1997 included 660 AF of State and federal deliveries to the DFG and the Department of Parks and Recreation (DPR) from the O'Neill Forebay area and San Luis Reservoir (Reach 3). The following tabulation details the components of these recreation deliveries:

O'Neill Forebay and San Luis Reservoir (Reach 3)			
	DPR	DFG	Total
State	93	256	349
Federal	77	209	266
Sub-total	170	465	635
Pools 16, 17, & 18 (Reach 5)			
	DPR	DFG	Total
State	0	14	14
Federal	0	11	11
Sub-total	0	25	25

Federal deliveries from the joint-use facilities in the San Luis Field Division during 1997 totaled 1,493,770 AF. There were 43 AF of Phase 1 nonchargeable refill water delivered to WWD in 1997.

Table 13. San Luis Reservoir Monthly Operation

1997

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow	Outlfow			Gain (+) And Loss (-)	Evaporation	Precipitation (in inches)
				Gianelli P-G Plant Pumping	Gianelli P-G Plant Generation	Pacheco Tunnel	Parks and Rec. Del			
Jan	540.73	1,999,062	95,658	130,026	31,025	13,695	0	10,352	1,080	5.91
Feb	539.13	1,978,868	-20,194	42,532	54,977	7,399	0	-350	2,581	0.13
Mar	541.57	2,009,693	30,825	63,799	19,796	8,588	0	-4,590	5,404	0.03
Apr	522.95	1,778,698	-230,995	24,579	238,117	17,781	0	324	8,689	0.01
May	478.40	1,266,881	-511,817	0	493,772	19,773	0	1,728	11,449	0.16
Jun	439.66	871,579	-395,302	12,085	396,550	17,537	0	6,700	10,424	0.05
Jul	403.83	553,683	-317,896	2,692	311,086	14,439	0	4,937	10,294	0.00
Aug	383.27	396,307	-157,376	107,412	248,933	11,355	0	-4,500	7,037	0.00
Sep	408.66	593,428	197,121	263,320	39,300	11,604	0	-15,295	6,444	0.00
Oct	434.97	827,147	233,719	274,078	28,633	4,835	0	-6,891	4,646	0.17
Nov	468.91	1,165,611	338,464	353,437	2,506	2,151	0	-10,316	1,871	2.95
Dec	511.62	1,642,982	477,371	500,507	0	2,035	15	-21,086	1,051	1.95
Total	---	---	-260,422	1,774,467	1,864,695	131,192	15	-38,987	70,970	11.36

Figure 16. Historical San Luis Reservoir Operation

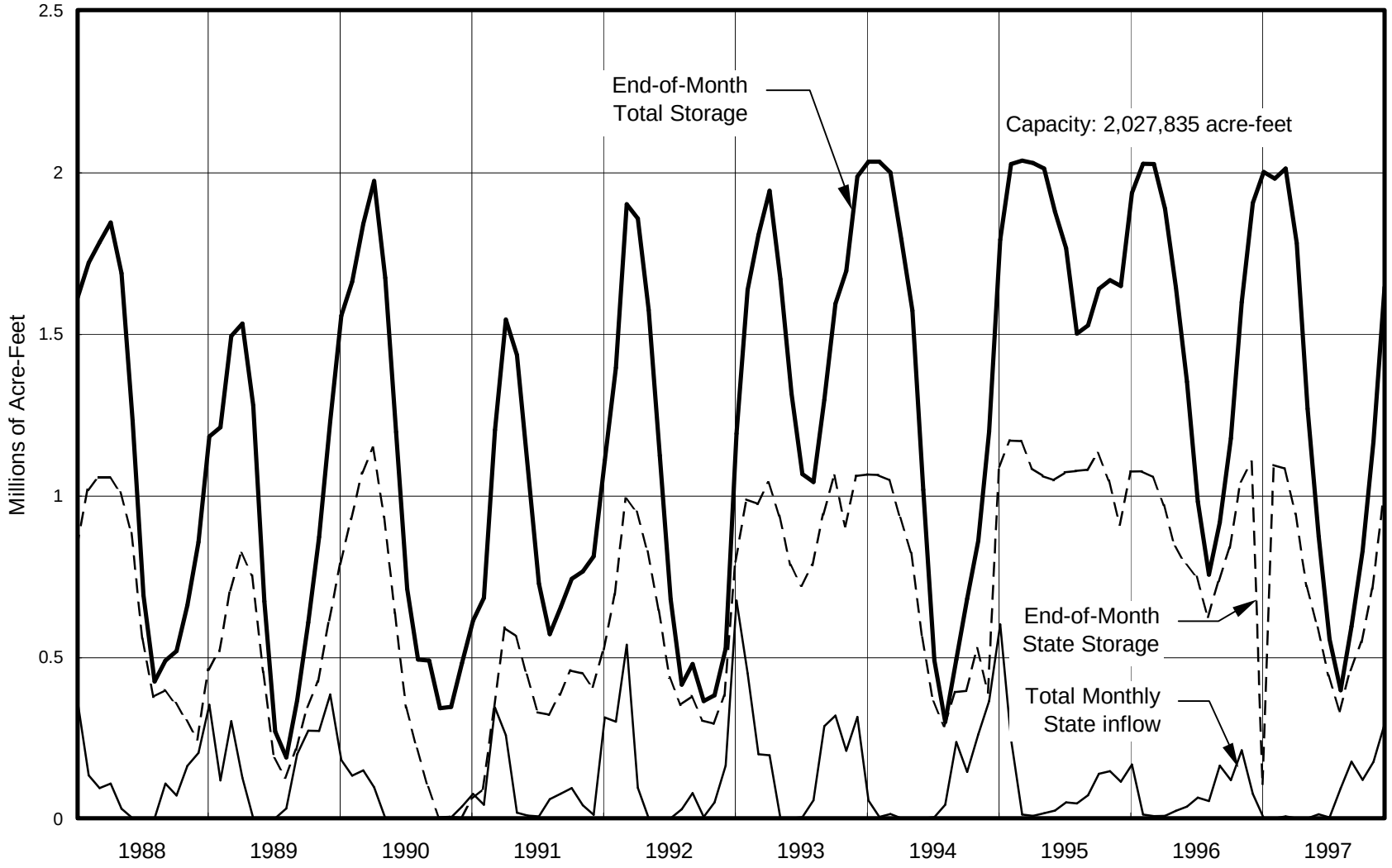


Table 14. O'Neill Forebay Monthly Operation

1997

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow				Outflow				Gain (+) And Losses (-)
				Pump In 1/	O'Neill P-G Plant Pumping	Gianelli P-G Plant Genertion	California Aqueduct Check 12	O'Neill P-G Plant Genertion	Gianelli P-G Plant Pumping	Dos Amigos Pumping	Deliveries	
Jan	218.70	39,825	-6,959	0	130,544	31,025	41,655	0	130,026	79,814	138	-205
Feb	219.68	42,325	2,500	0	19,531	54,977	83,884	1,362	42,532	110,755	863	-380
Mar	223.47	52,303	9,978	0	211,545	19,796	149,930	0	63,799	301,625	1,568	-4,301
Apr	220.89	45,472	-6,831	0	75,446	238,117	93,635	36,255	24,579	353,709	1,470	1,984
May	224.05	53,861	8,389	0	13,795	493,772	63,274	106,185	0	459,960	2,732	6,425
Jun	221.27	46,469	-7,392	1	44,352	396,550	136,243	1,581	12,085	560,329	3,234	-7,309
Jul	221.37	46,731	262	0	12,914	311,086	302,722	5,194	2,692	594,059	4,180	-20,335
Aug	220.76	45,132	-1,599	0	68,562	248,933	245,186	145	107,412	451,593	2,746	-2,384
Sep	221.77	47,782	2,650	0	87,609	39,300	324,362	0	263,320	197,809	987	13,495
Oct	222.80	50,513	2,731	0	161,672	28,633	256,356	0	274,078	173,149	825	4,122
Nov	220.21	43,697	-6,816	0	203,489	2,506	281,524	0	353,437	145,614	381	5,097
Dec	222.01	48,411	4,714	0	237,594	0	406,645	0	500,507	152,293	232	13,507
Total	---	---	1,627	1	1,267,053	1,864,695	2,385,416	150,722	1,774,467	3,580,709	19,356	9,716

1/ Pump-in located at Mile 79.67R.

Table 15. State-Federal San Luis Joint-Use Facilities Operation
1997
(In acre-feet except as noted)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Check 12													
State	41,655	26,387	117,674	93,635	63,274	136,243	286,720	231,290	282,617	216,719	281,524	406,645	2,184,383
Federal	0	57,497	32,256	0	0	0	16,002	13,896	41,745	39,637	0	0	201,033
Total	41,655	83,884	149,930	93,635	63,274	136,243	302,722	245,186	324,362	256,356	281,524	406,645	2,385,416
O'Neill P-G Plant													
Amount Pumped													
State	0	0	0	0	0	0	0	0	0	0	0	0	0
Federal	130,544	19,531	211,545	75,446	13,795	44,352	12,914	68,562	87,609	161,672	203,489	237,594	1,267,053
Total	130,544	19,531	211,545	75,446	13,795	44,352	12,914	68,562	87,609	161,672	203,489	237,594	1,267,053
Generation													
Federal	0	1,362	0	36,255	106,185	1,581	5,194	145	0	0	0	0	150,722
O'Neill Forebay													
End-of-Month Storage													
State *	78,719	79,875	43,965	42,429	65,345	41,772	12,851	-16,032	-16,490	-11,385	2,097	17,629	- - -
Federal *	-38,894	-37,550	8,338	3,043	-11,484	4,697	33,880	61,164	64,272	61,898	41,600	30,782	- - -
Total	39,825	42,325	52,303	45,472	53,861	46,469	46,731	45,132	47,782	50,513	43,697	48,411	- - -
San Luis Reservoir													
End-of-Month Storage													
State	1,097,702	1,096,649	1,084,999	944,920	721,932	593,082	445,200	334,542	461,642	547,907	713,695	993,505	- - -
Federal	901,360	882,219	924,694	833,778	544,949	278,497	108,483	61,765	131,786	279,240	451,916	649,477	- - -
Total	1,999,062	1,978,868	2,009,693	1,778,698	1,266,881	871,579	553,683	396,307	593,428	827,147	1,165,611	1,642,982	- - -
Gianelli P-G Plant													
Amount Pumped													
State	1,154	-1,077	5,422	-212	0	12,085	2,692	92,278	174,812	118,688	173,968	291,416	871,226
Federal	128,872	43,609	58,377	24,791	0	0	0	15,134	88,508	155,390	179,469	209,091	903,241
Total	130,026	42,532	63,799	24,579	0	12,085	2,692	107,412	263,320	274,078	353,437	500,507	1,774,467
Generation													
State	15,090	-216	14,547	140,045	223,938	144,620	153,289	200,461	39,300	28,633	2,506	0	962,213
Federal	15,935	55,193	5,249	98,072	269,834	251,930	157,797	48,472	0	0	0	0	902,482
Total	31,025	54,977	19,796	238,117	493,772	396,550	311,086	248,933	39,300	28,633	2,506	0	1,864,695
Pacheco Tunnel Diversion													
Federal	13,695	7,399	8,588	17,781	19,773	17,537	14,439	11,355	11,604	4,835	2,151	2,035	131,192
Dos Amigos P.P.													
State	41,508	27,415	128,594	238,173	283,530	272,816	427,425	335,470	156,732	125,738	118,264	121,739	2,277,404
Federal	38,306	83,340	173,031	115,536	176,430	287,513	166,634	106,123	41,077	36,935	27,350	30,554	1,282,829
Other	0	0	0	0	0	0	0	10,000	0	10,476	0	0	20,476
Total	79,814	110,755	301,625	353,709	459,960	560,329	594,059	451,593	197,809	173,149	145,614	152,293	3,580,709

* Negative storage share values indicate a deficit in storage withdrawals versus amounts stored and positive values larger than the reservoir capacity indicate a surplus of amounts stored versus storage withdrawals. The amounts are calculated using the first of the two methods described on Page 43.

San Joaquin Field Division

Water Deliveries

State deliveries in the San Joaquin Field Division totaled 1,115,847 AF in 1997. Water types include entitlement water, operational flood release, exchange water, purchase water, Coastal fill water, and transfer water. Kern County Water Agency (KCWA) represented 75 percent of the total SWP water delivered within the Division.

In addition to SWP deliveries, 11,272 AF of federal water was wheeled through SWP facilities to be delivered to the Kern National Wildlife Refuge.

The San Joaquin Field Division is the only field division in the SWP where there are no water storage facilities. All deliveries made from the Aqueduct are summarized in Table 22, and are totaled by agency and water type in Map 2 and Table 2.

Pumping Plants

Pumping plants in the San Joaquin Field Division include Las Perillas and Badger Hill on the Coastal Aqueduct, and Buena Vista, Teerink, Chrisman, and Edmonston on the California Aqueduct. A complete monthly summary of amounts pumped at all of these plants is shown on Table 1. A summary of energy used to pump at each plant is shown on Table 4.

During 1997, 2,054,827 AF of State water and 11,272 AF of federal water flowed past Check 21 into the San Joaquin Field Division

Southern Field Division

Water Storage

There are four storage reservoirs in the Southern Field Division (Pyramid, Castaic, Silverwood, and Perris) with a combined storage capacity of 701,320 AF. Combined storage at the beginning of the year was 613,725 AF. End-of-year combined storage was 647,182 AF. Complete monthly operation tables for all four reservoirs plus Elderberry Forebay and Castaic Lagoon, along with historical inflow and storage data for the last ten years, is summarized in Tables 16 through 21 and Figures 17 through 20.

Water Deliveries

SWP deliveries in the Southern Field Division totaled 870,832 AF. Eleven agencies received the water, which was almost all entitlement water. One exception was 3,624 AF of recreation water to the California Department of Parks and Recreation.

Pumping and Generating Plants

Pumping plants in the Southern Field Division include Oso and Castaic on the West Branch, and Pearblossom on the East Branch. A complete monthly summary of amounts pumped is shown on Table 1. A summary of energy used to pump and station service energy at each plant is shown on Table 4.

Generating plants in the Southern Field Division include Warne and Castaic on the West Branch, and Alamo, Mojave, and Devil Canyon on the East Branch. Energy available from each generating plant is summarized in Table 3. Combined generation at all five plants in 1997 totaled 1,180,958 MWh.

Table 16. Pyramid Lake Monthly Operation
1997

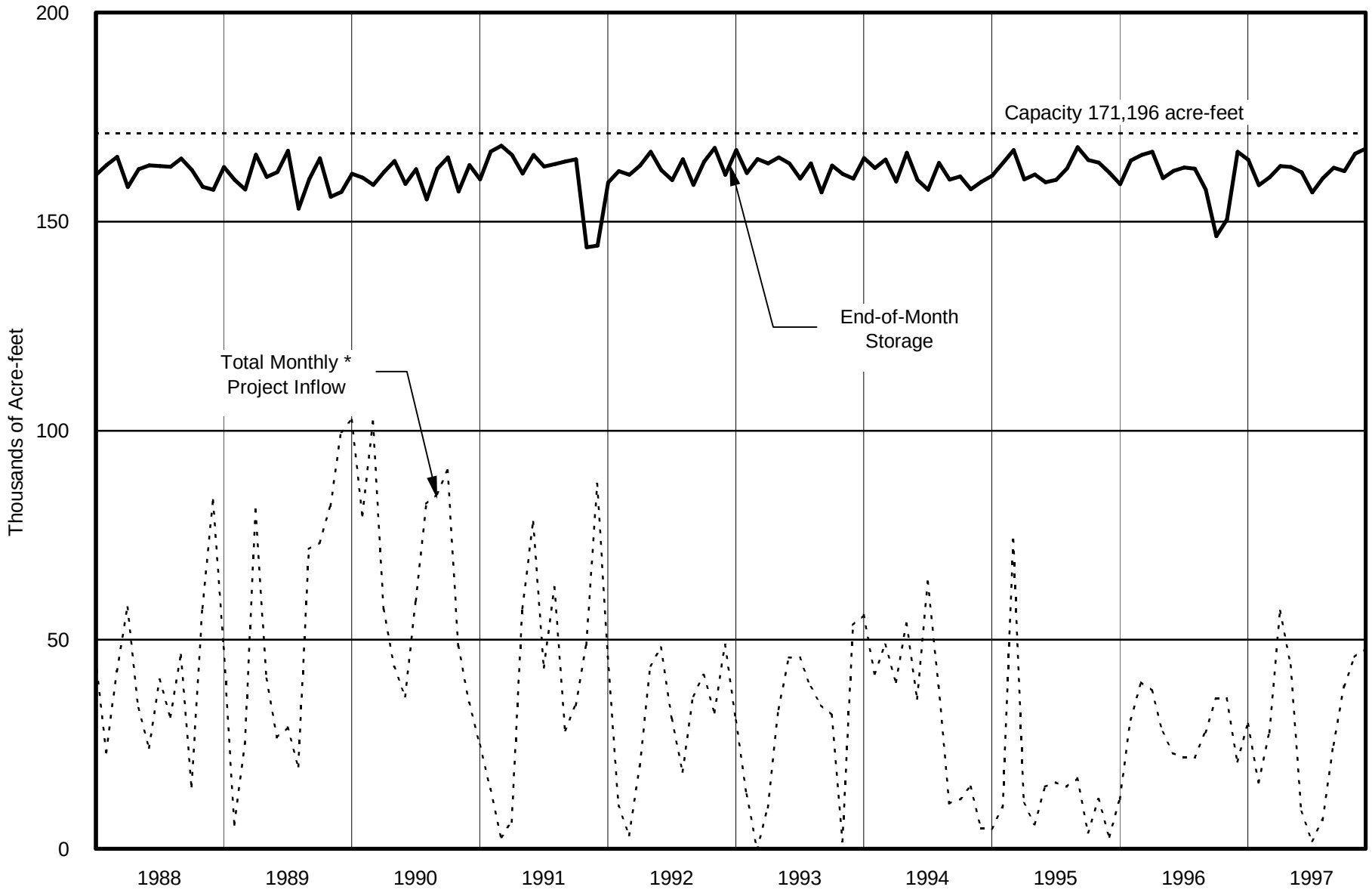
(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Natural Inflow Storage Shares	Storage Change	Inflow			Outflow			Computed Losses (-) Ans Gains (+)
					Project		Natural Stream Flow	Project		Natural To Piru Creek 2/	
					Castaic Powerplant Pumpback 1/	Warne Powerplant		Castaic Powerplant Generation	Recreation Deliveries		
Jan	2,573.99	164,776	1,447	-1,930	78,253	29,787	5,271	108,906	0	3,996	-2,339
Feb	2,569.12	158,689	-483	-6,087	84,504	16,116	1,983	102,691	0	3,913	-2,086
Mar	2,570.66	160,598	-762	1,909	107,676	27,841	1,278	130,894	0	1,557	-2,435
Apr	2,572.79	163,262	-1,271	2,664	68,439	57,042	987	120,591	0	1,496	-1,717
May	2,572.64	163,073	-2,173	-189	113,803	43,818	633	156,016	0	1,535	-892
Jun	2,571.62	161,795	-3,299	-1,278	111,508	8,581	367	121,854	0	1,493	1,613
Jul	2,767.72	156,967	-4,559	-4,828	148,633	2,015	295	153,306	0	1,555	-910
Aug	2,570.48	160,374	-5,833	3,407	150,598	6,970	291	150,504	0	1,565	-2,383
Sep	2,572.49	162,885	-6,526	2,511	108,229	25,444	336	129,971	3	1,029	-495
Oct	2,571.86	162,095	-6,465	-790	119,311	39,365	406	159,020	0	345	-507
Nov	2,575.14	166,235	-6,087	4,140	83,221	45,565	664	125,823	0	286	799
Dec	2,576.07	167,421	-2,807	1,186	57,447	47,555	6,985	106,130	0	3,705	-966
Total	- - -	- - -	- - -	715	1,231,622	350,099	19,496	1,565,706	3	22,475	-12,318

1/ Pumpback by Los Angeles Department of Water and Power (LADWP) from Elderberry Forebay through Castaic powerplant.

2/ Portions of these amounts are used to satisfy fishery enhancement agreement.

Figure 17. Historical Pyramid Lake Operation



* Excludes pumpback by LADWP through Castaic Powerplant.

Table 17. Elderberry Forebay Monthly Operation
1997

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow		Outflow			Computed Losses (-) And Gains (+)
				Castaic Powerplant Generation	Natural Stream Flow	Castaic Powerplant Pumpback 1/	To Castaic Lake		
							Natural	Project	
Jan	1515.73	21,457	2,541	108,906	2,398	78,253	2,398	28,107	-5
Feb	1524.78	25,318	3,861	102,691	844	84,504	844	14,438	112
Mar	1523.12	24,588	-730	130,894	310	107,676	310	24,249	301
Apr	1517.24	22,079	-2,509	120,591	114	68,439	114	54,429	-232
May	1520.78	23,574	1,495	156,016	7	113,803	7	39,624	-1,094
Jun	1518.60	22,648	-926	121,854	0	111,508	0	9,077	-2,195
Jul	1528.96	27,203	4,555	153,306	0	148,633	0	0	-118
Aug	1521.11	23,716	-3,487	150,504	0	150,598	0	4,652	1,259
Sep	1524.93	25,384	1,668	129,971	0	108,229	0	19,117	-957
Oct	1517.30	22,104	-3,280	159,020	0	119,311	0	41,644	-1,345
Nov	1512.00	19,962	-2,142	125,823	71	83,221	71	43,524	-1,220
Dec	1501.57	16,078	-3,884	106,130	790	57,447	790	51,386	-1,181
Total	- - -	- - -	-2,838	1,565,706	4,534	1,231,622	4,534	330,247	-6,675

1/ Pumpback by Los Angeles Department of Water and Power (LADWP) through Castaic Power Plant.

Table 18. Castaic Lake Monthly Operation
1997

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet) 1/	Storage	Natural Inflow Storage Shares	Storage Change	Inflow			Outflow		Computed Losses (-) Gains (+)
					From Elderberry Forebay		Natural	Deliveries	Released to Castaic Lagoon 1/	
					Natural	Project				
Jan	1,507.33	306,821	7,843	18,462	2,398	28,107	2,903	15,779	0	833
Feb	1,502.60	296,677	9,509	-10,144	844	14,438	822	25,079	0	-1,169
Mar	1,500.04	291,270	794	-5,407	310	24,249	452	22,438	9,477	1,497
Apr	1,510.05	312,746	111	21,476	114	54,429	209	31,288	1,006	-982
May	1,510.55	313,842	0	1,096	7	39,624	42	37,775	178	-624
Jun	1,497.47	285,901	0	-27,941	0	9,077	9	35,586	203	-1,238
Jul	1,484.98	260,621	0	-25,280	0	0	0	24,507	282	-491
Aug	1,474.17	239,761	0	-20,860	0	4,652	0	24,725	144	-643
Sep	1,472.55	236,715	0	-3,046	0	19,117	0	21,958	194	-11
Oct	1,473.94	239,327	0	2,612	0	41,644	0	37,925	429	-678
Nov	1,480.80	252,443	94	13,116	71	43,524	23	30,260	297	55
Dec	1,498.04	287,087	684	34,644	790	51,386	481	16,172	681	-1,160
Total	- - -	- - -	- - -	-1,272	4,534	330,247	4,941	323,492	12,891	-4,611

1/ June started dropping Castaic Lake elevation for repair of Boat ramp.

Figure 18. Historical Castaic Lake Operation

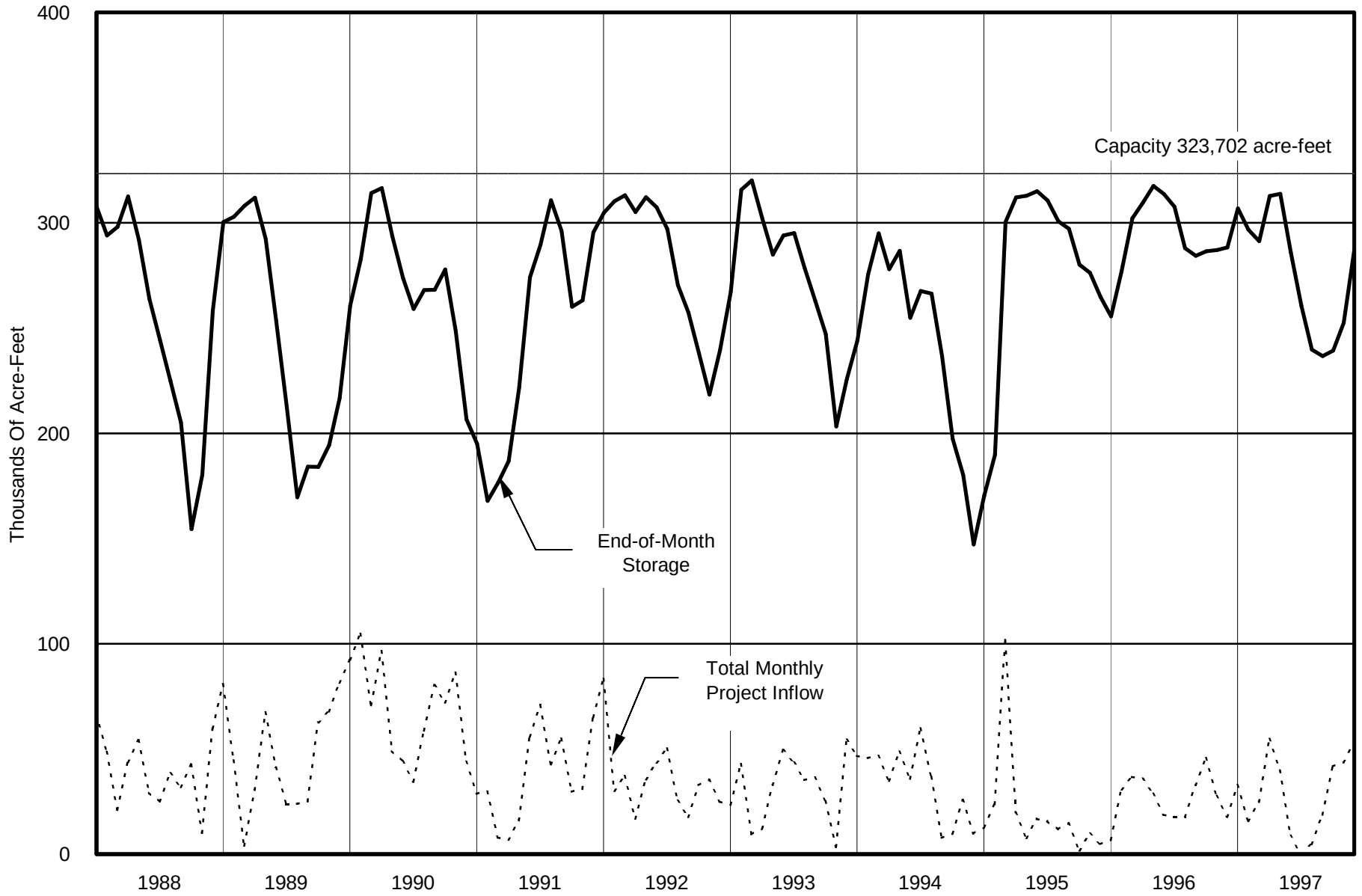


Table 19. Castaic Lagoon Monthly Operation
1997

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow	Natural Outflow		Deliveries to Recreation	Computed Losses (-) And Gains (+)
					Release From Castaic Lagoon			
					Surface	Sub-Surface		
Jan	1133.57	5,191	19	0	0	62	86	167
Feb	1133.16	5,113	-78	0	0	30	48	0
Mar	1136.24	5,709	596	9,477	8,737	63	81	0
Apr	1135.92	5,646	-63	1,006	873	90	106	0
May	1135.77	5,617	-29	178	0	70	137	0
Jun	1135.55	5,574	-43	203	0	118	128	0
Jul	1135.56	5,576	2	282	0	149	131	0
Aug	1134.81	5,430	-146	144	0	150	140	0
Sep	1134.40	5,350	-80	194	0	145	129	0
Oct	1135.05	5,476	126	429	0	194	109	0
Nov	1135.37	5,538	62	297	0	137	98	0
Dec	1136.05	5,672	134	681	310	155	82	0
Total	- - -	- - -	500	12,891	9,920	1,363	1,275	167

Table 20. Silverwood Lake Monthly Operation
1997

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow			Outflow					Computed Losses (-) And Gains (+)	Natural Inflow Exchanged Or Released 4/
							Project			Deliveries to Mojave Water Agency	Natural Inflow to Mojave River		
				Mojave Siphon Powerplant	Mojave Bypass Flume	Natural 1/	Delivered to CLAWA	Recreation	San Bernardino Tunnel				
Jan	3,261.44	12,293	-2,684	0	485	5,674	72	2	2/ 5091	0	4,552	874	5,198
Feb	3,257.90	10,969	-1,324	0	30	1,797	46	1	3/ 254	0	3,182	332	3,182
Mar	3,303.66	33,683	22,714	0	28,418	813	54	3	6,277	0	50	-133	341
Apr	3,335.01	56,820	23,137	14,793	58,709	322	57	6	51,101	0	5	482	809
May	3,336.28	57,894	1,074	54,556	14,585	124	107	9	69,938	0	6	1,869	877
Jun	3,336.73	58,277	383	52,722	7,640	34	102	10	60,106	0	7	212	618
Jul	3,344.53	65,129	6,852	71,332	5,805	0	145	16	70,446	163	8	493	613
Aug	3,346.75	67,153	2,024	58,218	10,766	0	169	19	64,517	899	8	-1,348	1,418
Sep	3,351.41	71,511	4,358	50,567	5,903	0	129	13	52,343	0	8	381	356
Oct	3,346.96	67,346	-4,165	26,110	1,909	0	91	8	31,929	0	9	-147	187
Nov	3,348.27	68,558	1,212	16,692	1,101	34	80	2	16,197	0	9	-327	22
Dec	3,348.99	69,229	671	14,188	978	182	86	2	14,806	0	11	228	155
Total	- - -	- - -	54,252	359,178	136,329	8,980	1,138	91	443,005	1,062	7,855	2,916	13,776

1/ Houston Creek appropriation included in total.

2/ 968 af added to DCPP total in Jan. A.V.M. operating erratically

3/ 254 AF added to DCPP total in Feb. A.V.M. operating erratically

4/ Total releases made from Mojave Siphon to Las Flores Ranch Co., in exchange for natural inflow stored in lake, and from Silverwood Lake to Mojave River from outlet for Mojave W.A. The difference between this total column and the natural inflow released to Mojave River equals the Las Flores Ranch.

Figure 19. Historical Silverwood Lake Operation

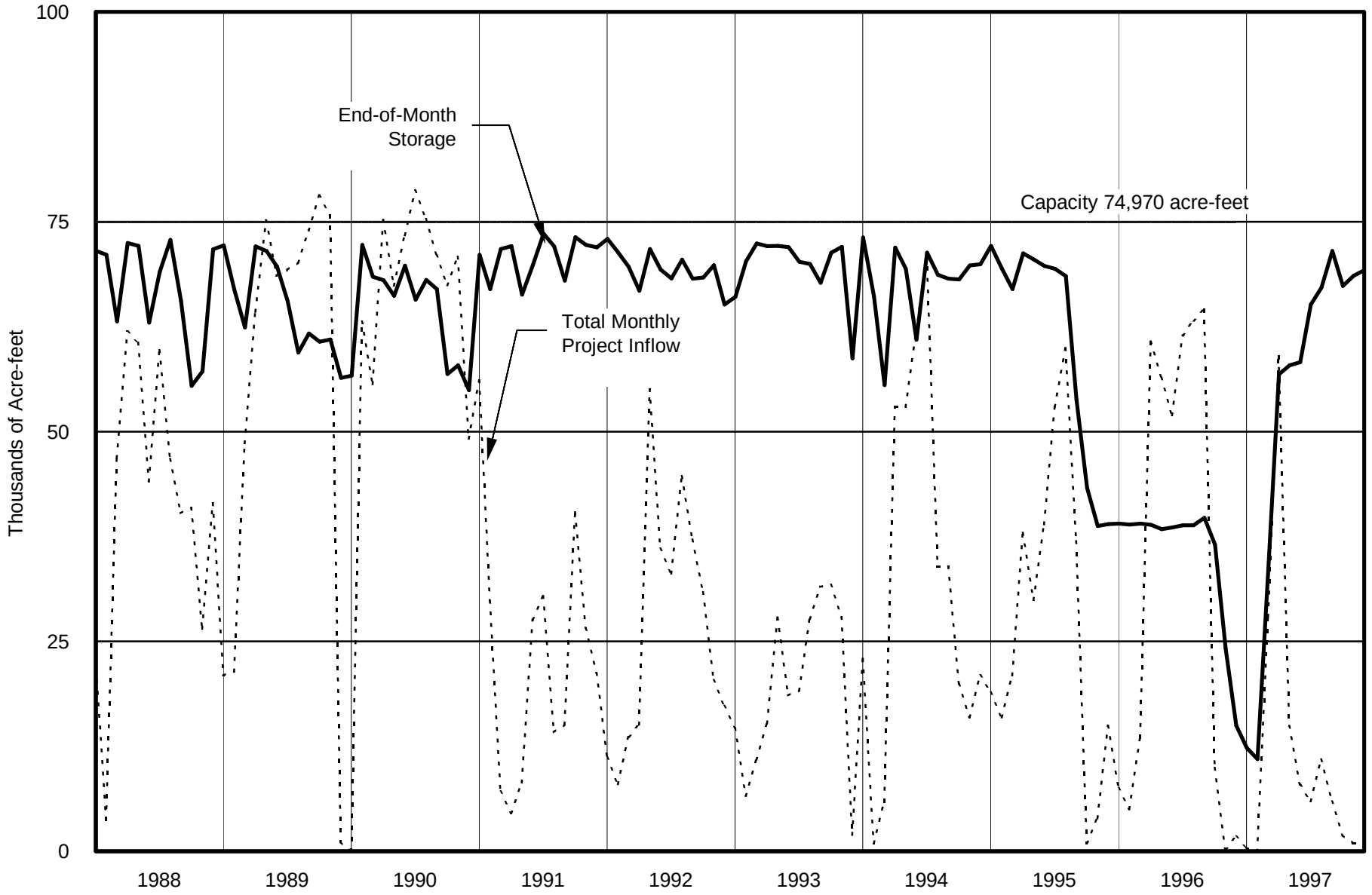


Table 21. Lake Perris Monthly Operation
1997

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow 1/	Outlfow 2/	Computed Losses (-) And Gains (+)
Jan	1586.92	124,374	-524	0	957	433
Feb	1585.25	120,597	-3,777	0	3,224	-553
Mar	1583.76	117,265	-3,332	428	2,864	-896
Apr	1581.59	112,474	-4,791	17,084	21,355	-520
May	1585.29	120,687	8,213	13,375	4,062	-1,100
Jun	1586.67	123,805	3,118	5,215	704	-1,393
Jul	1586.61	123,669	-136	1,290	383	-1,043
Aug	1584.38	118,647	-5,022	1,563	5,903	-682
Sep	1578.20	105,133	-13,514	1,421	14,513	-422
Oct	1578.80	106,418	1,285	3,326	312	-1,729
Nov	1579.01	106,871	453	1,331	292	-586
Dec	1579.24	107,367	496	1,209	304	-409
Total	---	---	-17,531	46,242	54,873	-8,900

1/ Calculated.

2/ Includes deliveries to MWD at Reach 28J and recreation water to Califonria State Park.

Figure 20. Historical Lake Perris Operation

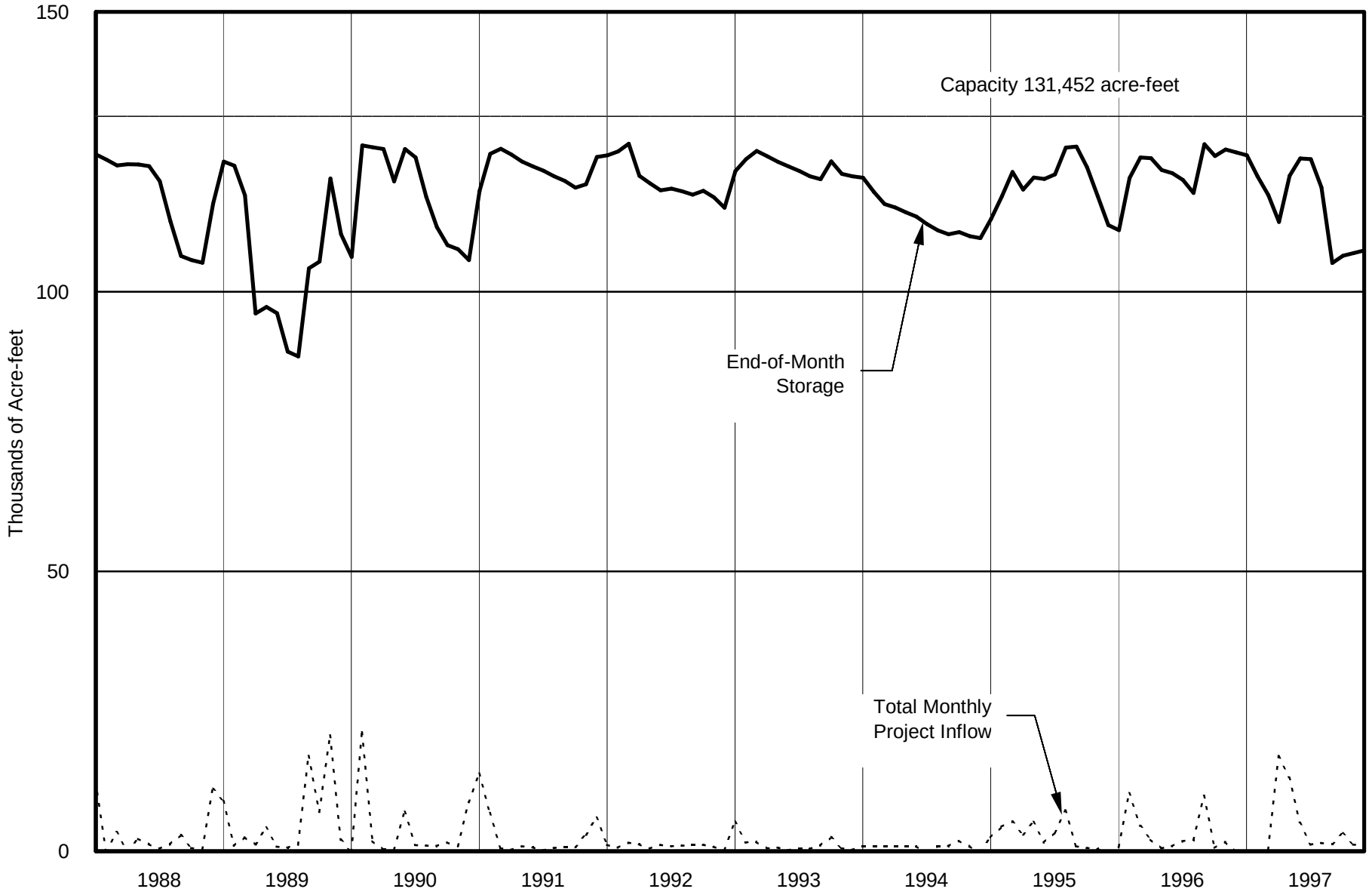


Table 22a. Summary of California Aqueduct Operation
1997
(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun
DELTA FIELD DIVISION						
North Bay Aqueduct	Note: North Bay Aqueduct, South Bay Aqueduct, and Lake Del Valle they are shown here					
Pumped at Barker Slough Pumping Plant	1,087	1,010	1,236	2,011	4,869	5,300
Deliveries (Travis & Fairfield/Vacaville)	94	150	130	817	2,458	2,673
Pumped at Cordelia Pumping Plant	937	882	981	1,103	2,274	2,426
Deliveries (Benicia, Vallejo, A.C. 1&2, & Napa)	937	882	981	1,103	2,274	2,426
Cordelia Spillway	0	0	0	0	0	0
Computed Losses (-), Gains (+)	-56	22	-125	-91	-137	-201
California Aqueduct						
Pumped at Banks Pumping Plant	45,266	90,350	162,393	105,648	78,830	153,328
Pumped at South Bay Pumping Plant	2,542	4,672	10,237	9,066	12,670	11,535
Delivered to Contracting Agencies	27	27	261	755	880	1,073
Inflow Into Aqueduct	0	0	0	0	0	0
Change in Storage	472	160	-36	-162	-161	1,096
Outflow at Check 12	41,655	83,884	149,930	93,635	63,274	136,243
Computed Losses (-), Gains (+)	-570	-1,607	-2,001	-2,354	-2,167	-3,381
South Bay Aqueduct						
Inflow from Lake Del Valle (Project)	0	5	0	0	0	0
Pumped at South Bay Pumping Plant	2,542	4,672	10,237	9,066	12,670	11,535
Inflow from Lake Del Valle (Natural)	1,231	2,509	838	0	381	2,038
Outflow, to Lake Del Valle	0	0	0	0	545	2,312
Delivered to Contracting Agencies	3,548	7,082	11,065	9,056	12,496	11,246
Computed Losses (-), Gains (+)	-225	-104	-10	-10	-10	-15
Lake Del Valle Operation:						
Natural inflow	38,992	4,546	1,689	733	266	58
Inflow from South Bay Aqueduct	0	0	0	0	545	2,312
Releases to South Bay Aqueduct	1,231	2,514	838	0	381	2,038
Releases to Arroyo Valle	30,555	928	0	0	0	0
Delivered to EBRP District	0	1	5	9	20	24
End-of-Month Storage	37,323	38,322	38,987	39,470	39,533	39,463
Change in Storage	7,162	999	665	483	63	-70
Evaporation Losses	-44	-104	-181	-241	-347	-378
SAN LUIS FIELD DIVISION						
O'Neill Forebay Operation						
End-of-Month Storage	39,825	42,325	52,303	45,472	53,861	46,469
Inflow, California Aqueduct	41,655	83,884	149,930	93,635	63,274	136,243
Inflow, O'Neill P.- G. Plant	130,544	19,531	211,545	75,446	13,795	44,352
Inflow, Gianelli P.- G. Plant	31,025	54,977	19,796	238,117	493,772	396,550
Pump in/Sisk Dam spill	0	0	0	0	0	1
Delivered to Dept. of Fish and Game (State)	8	0	4	31	41	18
Delivered to Dept. of Fish and Game (Fed.)	6	0	3	25	33	14
Delivered to Dept. of Parks & Rec. (Fed.)	0	0	0	0	0	0
Delivered to Dept. of Parks & Rec. (State)	0	0	0	0	0	0
Delivered to Fed. Customers	124	863	1,561	1,414	2,658	3,202
Outflow, O'Neill P.- G. Plant	0	1,362	0	36,255	106,185	1,581
Outflow, Gianelli P.- G. Plant	130,026	42,532	63,799	24,579	0	12,085
Outflow, Dos Amigos P.P.	79,814	110,755	301,625	353,709	459,960	560,329
Change in Storage	-6,959	2,500	9,978	-6,831	8,389	-7,392
Computed Losses (-), Gains (+)	-205	-380	-4,301	1,984	6,425	-7,309
San Luis Reservoir Operation						
State End-of-Month Storage	1,097,702	1,096,649	1,084,999	944,920	721,932	593,082
Total End-of-Month Storage	1,999,062	1,978,868	2,009,693	1,778,698	1,266,881	871,579
Inflow, Gianelli P.- G. Plant	130,026	42,532	63,799	24,579	0	12,085
Outflow, Gianelli P. - G. Plant	31,025	54,977	19,796	238,117	493,772	396,550
Delivered to Dept. of Parks & Rec. (Fed.)	0	0	0	0	0	0
Delivered to Dept. of Parks & Rec. (State)	0	0	0	0	0	0
Pacheco Tunnel Diversion	13,695	7,799	8,588	17,781	19,773	17,537
Sisk Dam Spill	0	0	0	0	0	0
Change in Storage (Total)	95,658	-20,194	30,825	-230,995	-511,817	-395,302
Computed Losses (-), Gains (+)	10,352	50	-4,590	324	1,728	6,700

Table 22a. Summary of California Aqueduct Operations
1997
(in acre-feet)

Jul	Aug	Sep	Oct	Nov	Dec	Total	Description
							DELTA FIELD DIVISION
are not within the Edmond G. Brown California Aqueduct, for completeness.							
							North Bay Aqueduct
5,955	5,750	3,606	3,371	2,863	2,235	39,293	Pumped at Barker Slough Pumping Plant
2,870	2,903	1,391	1,208	787	548	16,029	Deliveries (Travis & Fairfield/Vacaville)
2,861	2,695	2,090	2,013	1,973	1,607	21,842	Pumped at Cordelia Pumping Plant
2,861	2,695	2,090	2,013	1,973	1,607	21,842	Deliveries (Benicia, Vallejo, A.C. 1&2, & Napa)
0	0	0	0	0	0	0	Cordelia Spillway
-224	-152	-125	-150	-103	-80	-1,422	Computed Losses (-), Gains (+)
							California Aqueduct
322,379	268,048	339,410	265,902	293,437	419,695	2,544,686	Pumped at Banks Pumping Plant
15,652	15,561	8,093	5,969	7,392	6,210	109,599	Pumped at South Bay Pumping Plant
1,094	616	519	229	105	28	5,614	Delivered to Contracting Agencies
0	0	0	0	0	0	0	Inflow Into Aqueduct
-136	-46	266	-719	94	-208	620	Change in Storage
302,722	245,186	324,362	256,356	281,524	406,645	2,385,416	Outflow at Check 12
-3,047	-6,731	-6,170	-4,067	-4,322	-7,020	-43,437	Computed Losses (-), Gains (+)
							South Bay Aqueduct
0	0	0	0	0	0	5	Inflow from Lake Del Valle (Project)
15,652	15,561	8,093	5,969	7,392	6,210	109,599	Pumped at South Bay Pumping Plant
0	0	6,335	5,284	1,462	203	20,281	Inflow from Lake Del Valle (Natural)
577	0	0	0	0	0	3,434	Outflow, to Lake Del Valle
15,065	15,551	14,418	11,243	8,833	6,392	125,995	Delivered to Contracting Agencies
-10	-10	-10	-10	-21	-21	-456	Computed Losses (-), Gains (+)
							Lake Del Valle Operation:
-49	-107	15	-223	258	1,098	47,276	Natural inflow
577	0	0	0	0	0	3,434	Inflow from South Bay Aqueduct
0	0	6,335	5,284	1,462	203	20,286	Releases to South Bay Aqueduct
0	0	0	0	0	0	31,483	Releases to Arroyo Valle
29	23	21	12	6	5	155	Delivered to EBRP District
39,519	38,994	32,272	26,538	25,260	26,093	- - -	End-of-Month Storage
56	-525	-6,722	-5,734	-1,278	833	-4,068	Change in Storage
-443	-395	-381	-215	-68	-57	-2,854	Evaporation Losses
							SAN LUIS FIELD DIVISION
							O'Neill Forebay Operation
46,731	45,132	47,782	50,513	43,697	48,411	- - -	End-of-Month Storage
302,722	245,186	324,362	256,356	281,524	406,645	2,385,416	Inflow, California Aqueduct
12,914	68,562	87,609	161,672	203,489	237,594	1,267,053	Inflow, O'Neill P.- G. Plant
311,086	248,933	39,300	28,633	2,506	0	1,864,695	Inflow, Gianelli P.- G. Plant
0	0	0	0	0	0	1	Pump in/Sisk Dam spill
6	4	10	76	38	20	256	Delivered to Dept. of Fish and Game (State)
5	3	9	63	31	17	209	Delivered to Dept. of Fish and Game (Fed.)
0	0	0	0	0	70	70	Delivered to Dept. of Parks & Rec. (Fed.)
0	0	0	0	0	85	85	Delivered to Dept. of Parks & Rec. (State)
4,169	2,739	968	686	312	40	18,736	Delivered to Fed. Customers
5,194	145	0	0	0	0	150,722	Outflow, O'Neill P.- G. Plant
2,692	107,412	263,320	274,078	353,437	500,507	1,774,467	Outflow, Gianelli P.- G. Plant
594,059	451,593	197,809	173,149	145,614	152,293	3,580,709	Outflow, Dos Amigos P.P.
262	-1,599	2,650	2,731	-6,816	4,714	1,627	Change in Storage
-20,335	-2,384	13,495	4,122	5,097	13,507	9,716	Computed Losses (-), Gains (+)
							San Luis Reservoir Operation
445,200	334,542	461,642	547,907	713,695	993,505	- - -	State End-of-Month Storage
553,683	396,307	593,428	827,147	1,165,611	1,642,982	- - -	Total End-of-Month Storage
2,692	107,412	263,320	274,078	353,437	500,507	1,774,467	Inflow, Gianelli P.- G. Plant
311,086	248,933	39,300	28,633	2,506	0	1,864,695	Outflow, Gianelli P. - G. Plant
0	0	0	0	0	7	7	Delivered to Dept. of Parks & Rec. (Fed.)
0	0	0	0	0	8	8	Delivered to Dept. of Parks & Rec. (State)
14,439	11,355	11,604	4,835	2,151	2,035	131,592	Pacheco Tunnel Diversion
0	0	0	0	0	0	0	Sisk Dam Spill
-317,896	-157,376	197,121	233,719	338,464	477,371	-260,422	Change in Storage (Total)
4,937	-4,500	-15,295	-6,891	-10,316	-21,086	-38,587	Computed Losses (-), Gains (+)

Table 22b. Summary of California Aqueduct Operation (cont.)

1997

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun
SAN LUIS FIELD DIVISION (Cont.)						
California Aqueduct (Pools 14 thru 21)						
Inflow, Dos Amigos P.P.(State)	41,508	27,415	128,594	238,173	283,530	272,816
Inflow, Dos Amigos P.P.(Fed. and Other)	38,306	83,340	173,031	115,536	176,430	287,513
Total Inflow, Dos Amigos P.P.	79,814	110,755	301,625	353,709	459,960	560,329
Flow into Aqueduct	2,067	50	18	2	11	1
Delivered to Dept. of Fish and Game (State)	0	0	14	0	0	0
Delivered to Dept. of Fish and Game (Fed.)	0	0	11	0	0	0
Miscellaneous Outflow	0	0	0	0	0	0
Delivered to Fed. Customers (State Transfers)	0	0	0	10,443	0	500
Delivered to Fed. Customers 1/	56,022	89,719	136,394	102,829	187,282	273,843
Outflow, Check 21 (State)	19,885	17,195	156,098	232,016	260,726	282,510
Outflow, Check 21 (Fed.)	0	0	0	0	0	0
Change in Storage	2,624	393	892	-356	1,076	-243
Computed Losses (-), Gains (+)	-3,350	-3,498	-8,234	-8,779	-10,887	-3,720
SAN JOAQUIN FIELD DIVISION						
California Aqueduct, Check 21 to Buena Vista Pumping Plant						
Inflow, Check 21 (State)	19,885	17,195	156,098	232,016	260,726	282,510
Inflow, Check 21 (Fed.)	0	0	0	0	0	0
Total Inflow, Check 21	19,885	17,195	156,098	232,016	260,726	282,510
Kern River Intertie	25,566	27,282	0	0	0	0
Delivered to Contracting State Agencies	3,971	16,711	60,757	58,403	84,927	139,008
Delivered to Fed. Customers	0	0	0	0	0	0
Kern Water Bank Preconsol. Return	0	0	0	0	0	0
Outflow, Buena Vista P.P.	39,443	24,607	84,980	157,939	154,115	120,752
Coastal Br. Diversion	0	720	6,587	11,909	17,229	20,410
Change in Storage	108	711	-516	728	37	121
Computed Losses (-), Gains (+)	-1,929	-1,728	-4,290	-3,037	-4,418	-2,219
California Aqueduct, Buena Vista P.P. to Teerink Pumping Plant						
Inflow, Buena Vista P.P.	39,443	24,607	84,980	157,939	154,115	120,752
Delivered to Contracting State Agencies	1,477	5,268	15,650	13,119	18,476	25,725
W.R.M.W.S.D. Pumpback	0	0	0	0	0	0
Outflow, Teerink Pumping Plant	38,964	19,471	71,442	148,932	139,652	97,680
Change in Storage	77	196	-13	-193	75	170
Computed Losses (-), Gains (+)	1,075	328	2,099	3,919	4,088	2,823
California Aqueduct, Teerink Pumping Plant to Chrisman Pumping Plant						
Inflow, Teerink Pumping Plant	38,964	19,471	71,442	148,932	139,652	97,680
Delivered to Contracting State Agencies	742	613	2,681	4,249	6,158	6,810
Outflow, Chrisman Pumping Plant	36,805	17,845	67,876	143,029	131,644	89,973
Change in Storage	-16	13	5	-8	61	-63
Computed Losses (-), Gains (+)	-1,433	-1,000	-880	-1,662	-1,790	-960
California Aqueduct, Chrisman Pumping Plant to Edmonston Pumping Plant						
Inflow, Chrisman Pumping Plant	36,805	17,845	67,876	143,029	131,644	89,973
Delivered to Contracting State Agencies	440	287	1,028	2,315	2,550	3,732
Outflow, Edmonston Pumping Plant	36,672	17,857	65,840	139,553	126,780	85,048
Change in Storage	33	26	-61	-27	44	-55
Computed Losses (-), Gains (+)	340	325	-1,069	-1,188	-2,270	-1,248
Coastal Branch, California Aqueduct						
Inflow, Las Perillas P.P.	0	720	6,587	11,909	17,229	20,410
B.M.W.S.D. Pumpback	0	0	0	0	0	0
Delivered to Contracting State Agencies	12	553	6,043	10,894	16,331	18,963
Delivered to Fed. Customers	0	0	0	0	0	0
Change in Storage	-22	25	-14	15	-4	-17
Computed Losses (-), Gains (+)	-10	-142	-558	-1,000	-902	-1,464

Table 22b. Summary of California Aqueduct Operations (cont.)

1997

(in acre-feet)

Jul	Aug	Sep	Oct	Nov	Dec	Total	Description
							SAN LUIS FIELD DIVISION (Cont.)
							California Aqueduct (Pools 14 thru 21)
427,425	335,470	156,732	125,738	118,264	121,739	2,277,404	Inflow, Dos Amigos P.P.(State)
166,634	116,123	41,077	47,411	27,350	30,554	1,303,305	Inflow, Dos Amigos P.P.(Fed. and Other)
594,059	451,593	197,809	173,149	145,614	152,293	3,580,709	Total Inflow, Dos Amigos P.P.
3	0	0	0	0	0	2,152	Flow into Aqueduct
0	0	0	0	0	0	14	Delivered to Dept. of Fish and Game (State)
0	0	0	0	0	0	11	Delivered to Dept. of Fish and Game (Fed.)
0	0	0	0	0	0	0	Miscellaneous Outflow
92,500	65,000	4,661	4,086	4,195	3,157	184,542	Delivered to Fed. Customers (State Transfers)
185,210	122,737	38,274	38,968	27,394	31,158	1,289,830	Delivered to Fed. Customers 1/
331,912	268,802	149,069	117,760	107,033	111,821	2,054,827	Outflow, Check 21 (State)
0	2,270	2,630	4,103	2,269	0	11,272	Outflow, Check 21 (Fed.)
387	229	-1,113	-630	711	-542	3,428	Change in Storage
15,947	7,445	-4,288	-8,862	-4,012	-6,699	-38,937	Computed Losses (-), Gains (+)
							SAN JOAQUIN FIELD DIVISION
							California Aqueduct, Check 21 to Buena Vista Pumping Plant
331,912	268,802	149,069	117,760	107,033	111,821	2,054,827	Inflow, Check 21 (State)
0	2,270	2,630	4,103	2,269	0	11,272	Inflow, Check 21 (Fed.)
331,912	271,072	151,699	121,863	109,302	111,821	2,066,099	Total Inflow, Check 21
0	0	0	0	0	0	52,848	Kern River Intertie
170,117	133,808	37,370	27,459	28,961	40,910	802,402	Delivered to Contracting State Agencies
0	2,270	2,630	4,103	2,269	0	11,272	Delivered to Fed. Customers
0	0	0	0	0	0	0	Kern Water Bank Preconsol. Return
133,340	117,167	101,472	82,136	73,240	65,608	1,154,799	Outflow, Buena Vista P.P.
21,858	16,710	8,260	8,266	2,916	4,433	119,298	Coastal Br. Diversion
-242	489	20	-355	165	-463	802	Change in Storage
-6,839	-628	-1,947	-254	-1,751	-1,333	-30,374	Computed Losses (-), Gains (+)
							California Aqueduct, Buena Vista P.P. to Teerink Pumping Plant
133,340	117,167	101,472	82,136	73,240	65,608	1,154,799	Inflow, Buena Vista P.P.
29,317	19,613	6,120	4,918	2,184	1,215	143,082	Delivered to Contracting State Agencies
0	0	0	0	0	0	0	W.R.M.W.S.D. Pumpback
107,742	100,947	98,467	79,184	73,599	66,623	1,042,703	Outflow, Teerink Pumping Plant
-61	110	27	-34	32	-141	245	Change in Storage
3,658	3,503	3,142	1,932	2,575	2,089	31,231	Computed Losses (-), Gains (+)
							California Aqueduct, Teerink Pumping Plant to Chrisman Pumping Plant
107,742	100,947	98,467	79,184	73,599	66,623	1,042,703	Inflow, Teerink Pumping Plant
6,336	4,272	2,565	2,152	829	229	37,636	Delivered to Contracting State Agencies
100,832	95,555	94,761	76,380	72,096	66,890	993,686	Outflow, Chrisman Pumping Plant
-13	0	-25	52	8	-40	-26	Change in Storage
-587	-1,120	-1,166	-600	-666	456	-11,407	Computed Losses (-), Gains (+)
							California Aqueduct, Chrisman Pumping Plant to Edmonston Pumping Plant
100,832	95,555	94,761	76,380	72,096	66,890	993,686	Inflow, Chrisman Pumping Plant
3,770	3,228	2,076	1,512	626	208	21,772	Delivered to Contracting State Agencies
95,545	91,539	91,231	74,218	70,459	66,372	961,114	Outflow, Edmonston Pumping Plant
45	-150	82	-525	536	63	11	Change in Storage
-1,472	-938	-1,372	-1,175	-475	-248	-10,790	Computed Losses (-), Gains (+)
							Coastal Branch, California Aqueduct
21,858	16,710	8,260	8,266	2,916	4,433	119,298	Inflow, Las Perillas P.P.
0	0	0	0	0	0	0	B.M.W.S.D. Pumpback
20,100	15,594	7,587	7,866	2,817	4,195	110,955	Delivered to Contracting State Agencies
0	0	0	0	0	0	0	Delivered to Fed. Customers
8	12	-24	14	4	-10	-12	Change in Storage
-1,750	-1,104	-697	-386	-96	-248	-8,355	Computed Losses (-), Gains (+)

1/ Includes 43 AF if phase 1 non-chargeable refill water to WWD.

Table 22c. Summary of California Aqueduct Operation (cont.)

1997

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun
SOUTHERN FIELD DIVISION						
Tehachapi Afterbay Operation						
Inflow from Edmonston P.P.	36,672	17,857	65,840	139,553	126,780	85,048
Outflow to West Branch	28,685	17,539	28,579	58,185	45,177	10,866
Outflow to East Branch	7,987	316	37,262	81,326	81,583	74,138
Change in Storage	6	4	-10	7	-2	-1
Computed Losses (-), Gains (+)	6	2	-9	-35	-22	-45
California Aqueduct, Tehachapi Afterbay to Pearblossom P.P.						
Inflow (Aqueduct)	7,987	316	37,262	81,326	81,583	74,138
Inflow (L.A.D.W.P.)	0	0	0	0	0	0
Delivered to Contracting Agencies	3,251	1,878	5,487	6,664	8,847	11,103
Outflow, Pearblossom P.P.	3,948	46	29,471	72,388	71,769	59,334
Change in Storage	1,219	-1,426	1,607	-330	-690	391
Computed Losses (-), Gains (+)	431	182	-697	-2,604	-1,657	-3,310
California Aqueduct, Pearblossom P.P. to Silverwood Lake						
Inflow, Pearblossom P.P.	3,948	46	29,471	72,388	71,769	59,334
Deliveries (Exchange of Natural Inflow)	891	584	692	572	638	687
Exchange of Natural Inflow (Los Flores T.O.)	646	0	291	804	871	611
Outflow to Silverwood Lake	485	30	28,418	73,502	69,141	60,362
Change in Storage	1,256	-919	250	-575	888	-627
Computed Losses (-), Gains (+)	-670	-351	180	1,915	-231	1,699
Silverwood Lake Operation						
Inflow, Project	485	30	28,418	73,502	69,141	60,362
Inflow, Natural	5,674	1,797	813	322	124	34
Delivered to Contracting Agencies	72	46	54	57	107	102
Recreation Deliveries	2	1	3	6	9	10
Outflow, Natural Inflow Released	4,552	3,182	50	5	6	7
Outflow, Project Water at San Bernardino Tunnel	5,091	254	6,277	51,101	69,938	60,106
Change in storage	-2,684	-1,324	22,714	23,137	1,074	383
Computed Losses (-), Gains (+)	874	332	-133	482	1,869	212
California Aqueduct, Silverwood Lake to Lake Perris						
Inflow, SBMWD Reverse Flow	55	1,742	357	0	0	0
Inflow, San Bernardino Tunnel	5,091	254	6,277	51,101	69,938	60,106
Inflow, MWD Pumpback	613	2,918	2,513	0	0	0
Delivered to Contracting Agencies	6,282	4,412	8,655	34,025	56,586	55,047
Outflow to Lake Perris	0	0	428	17,084	13,375	5,215
Change in Storage	-547	493	53	-19	-34	-167
Operational Losses (-), Gains (+)	-24	-9	-11	-11	-11	-11
Lake Perris Operation						
Inflow	0	0	428	17,084	13,375	5,215
Delivered to Contracting Agencies	339	297	316	21,321	4,010	659
Recreation Deliveries	5	9	35	34	52	45
Outflow (Pumpback)	613	2,918	2,513	0	0	0
Change in Storage	-524	-3,777	-3,332	-4,791	8,213	3,118
Computed Losses (-), Gains (+)	433	-553	-896	-520	-1,100	-1,393

Table 22c. Summary of California Aqueduct Operations (cont.)

1997

(in acre-feet)

Jul	Aug	Sep	Oct	Nov	Dec	Total	Description
							SOUTHERN FIELD DIVISION
							Tehachapi Afterbay Operation
95,545	91,539	91,231	74,218	70,459	66,372	961,114	Inflow from Edmonston P.P.
1,855	7,896	25,585	38,263	46,929	47,582	357,141	Outflow to West Branch
93,643	83,606	65,612	35,929	23,514	18,775	603,691	Outflow to East Branch
-2	2	-2	6	-7	1	2	Change in Storage
-49	-35	-36	-20	-23	-14	-280	Computed Losses (-), Gains (+)
							California Aqueduct, Tehachapi Afterbay to Pearblossom P.P.
93,643	83,606	65,612	35,929	23,514	18,775	603,691	Inflow (Aqueduct)
0	0	0	0	0	0	0	Inflow (L.A.D.W.P.)
11,513	10,876	7,346	5,306	2,048	1,704	76,023	Delivered to Contracting Agencies
77,970	70,125	55,643	29,239	19,556	16,330	505,819	Outflow, Pearblossom P.P.
543	-9	-20	-71	232	-276	1,170	Change in Storage
-3,617	-2,614	-2,643	-1,455	-1,678	-1,017	-20,679	Computed Losses (-), Gains (+)
							California Aqueduct, Pearblossom P.P. to Silverwood Lake
77,970	70,125	55,643	29,239	19,556	16,330	505,819	Inflow, Pearblossom P.P.
1,068	1,271	744	1,191	1,959	1,279	11,576	Deliveries (Exchange of Natural Inflow)
605	511	348	187	13	144	5,031	Exchange of Natural Inflow (Los Flores T.O.)
77,137	68,984	56,470	28,019	17,793	15,166	495,507	Outflow to Silverwood Lake
89	426	-668	325	412	-70	787	Change in Storage
929	1,067	1,251	483	621	189	7,082	Computed Losses (-), Gains (+)
							Silverwood Lake Operation
77,137	68,984	56,470	28,019	17,793	15,166	495,507	Inflow, Project
0	0	0	0	34	182	8,980	Inflow, Natural
308	1,068	129	91	80	86	2,200	Delivered to Contracting Agencies
16	19	13	8	2	2	91	Recreation Deliveries
8	8	8	9	9	11	7,855	Outflow, Natural Inflow Released
70,446	64,517	52,343	31,929	16,197	14,806	443,005	Outflow, Project Water at San Bernardino Tunnel
6,852	2,024	4,358	-4,165	1,212	671	54,252	Change in storage
493	-1,348	381	-147	-327	228	2,916	Computed Losses (-), Gains (+)
							California Aqueduct, Silverwood Lake to Lake Perris
0	0	0	0	0	0	2,154	Inflow, SBMWD Reverse Flow
70,446	64,517	52,343	31,929	16,197	14,806	443,005	Inflow, San Bernardino Tunnel
0	0	0	0	0	0	6,044	Inflow, MWD Pumpback
69,108	63,030	50,953	29,136	14,884	13,656	405,774	Delivered to Contracting Agencies
1,290	1,563	1,421	3,326	1,331	1,209	46,242	Outflow to Lake Perris
37	-87	-41	-542	-28	-70	-952	Change in Storage
-11	-11	-10	-9	-10	-11	-139	Operational Losses (-), Gains (+)
							Lake Perris Operation
1,290	1,563	1,421	3,326	1,331	1,209	46,242	Inflow
316	5,848	14,466	279	274	288	48,413	Delivered to Contracting Agencies
67	55	47	33	18	16	416	Recreation Deliveries
0	0	0	0	0	0	6,044	Outflow (Pumpback)
-136	-5,022	-13,514	1,285	453	496	-17,531	Change in Storage
-1,043	-682	-422	-1,729	-586	-409	-8,900	Computed Losses (-), Gains (+)

Table 22d. Summary of California Aqueduct Operation (cont.)

1997

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun
SOUTHERN FIELD DIVISION (Cont.)						
West Branch California Aqueduct Tehachapi Afterbay to Oso P.P.						
Inflow	28,685	17,539	28,579	58,185	45,177	10,866
Outflow, Oso Pumping Plant	28,685	17,533	28,582	58,056	45,114	10,731
Change in Storage	18	13	-32	21	-6	-2
Computed Losses (-), Gains (+)	18	7	-29	-108	-69	-137
West Branch California Aqueduct Oso P.P. to Pyramid Lake						
Inflow, Oso P.P.	28,685	17,533	28,582	58,056	45,114	10,731
Deliveries	0	0	0	0	0	0
Outflow Through Warne to Pyramid Lake	29,787	16,116	27,841	57,042	43,818	8,581
Change in Storage	-1,578	1,093	233	-669	-175	1,766
Operational Losses (-), Gains (+)	-476	-324	-508	-1,683	-1,471	-384
Pyramid Lake Operation						
Inflow, Project	29,787	16,116	27,841	57,042	43,818	8,581
Inflow, Natural	5,271	1,983	1,278	987	633	367
Inflow, Pumpback from Elderberry Forebay	78,253	84,504	107,676	68,439	113,803	111,508
Deliveries (Fish Enhancement)	0	0	0	0	0	0
Deliveries	0	0	0	0	0	0
Delivered to Dept. of Parks and Rec. (State)	0	0	0	0	0	0
Outflow, Pyramid Diversion	3,996	3,913	1,557	1,496	1,535	1,493
Outflow, Angeles Tunnel	108,906	102,691	130,894	120,591	156,016	121,854
Change in Storage	-1,930	-6,087	1,909	2,664	-189	-1,278
Computed Losses (-), Gains (+)	-2,339	-2,086	-2,435	-1,717	-892	1,613
Elderberry Forebay Operation						
Inflow, Project through Castaic P-G Plant	108,906	102,691	130,894	120,591	156,016	121,854
Inflow, Natural	2,398	844	310	114	7	0
Outflow, Pumpback to Pyramid Lake	78,253	84,504	107,676	68,439	113,803	111,508
Outflow, Project Water Released to Castaic Lake	30,505	15,282	24,559	54,543	39,631	9,077
Change in Storage	2,541	3,861	-730	-2,509	1,495	-926
Computed Losses (-), Gains (+)	-5	112	301	-232	-1,094	-2,195
Castaic Lake Operation						
Inflow, Project	30,505	15,282	24,559	54,543	39,631	9,077
Inflow, Natural	2,903	822	452	209	42	9
Delivered to Contracting Agencies	15,775	25,069	22,411	31,262	37,677	35,556
Deliveries to Recreation (State)	4	10	27	26	98	30
Outflow, Castaic Lagoon	0	0	9,477	1,006	178	203
Change in Storage	18,462	-10,144	-5,407	21,476	1,096	-27,941
Computed Losses (-), Gains (+)	833	-1,169	1,497	-982	-624	-1,238
Castaic Lagoon Operation						
Inflow (Recreation Entitlement Deliveries)	0	0	0	0	18	194
Inflow	0	0	9,477	1,006	160	9
Inflow, Non-project	0	0	0	0	0	0
Outflow	62	30	8,800	963	70	118
Deliveries to Recreation (State)	86	48	81	106	137	128
Change in Storage	19	-78	596	-63	-29	-43
Computed Losses (-), Gains (+)	167	0	0	0	0	0

Table 22d. Summary of California Aqueduct Operations (cont.)

1997

(in acre-feet)

Jul	Aug	Sep	Oct	Nov	Dec	Total	Description
							SOUTHERN FIELD DIVISION (Cont.)
							West Branch California Aqueduct Tehachapi Afterbay to Oso P.P.
1,855	7,896	25,585	38,263	46,929	47,582	357,141	Inflow
1,710	7,779	25,483	38,190	46,880	47,537	356,280	Outflow, Oso Pumping Plant
-4	9	-6	13	-20	3	7	Change in Storage
-149	-108	-108	-60	-69	-42	-854	Computed Losses (-), Gains (+)
							West Branch California Aqueduct Oso P.P. to Pyramid Lake
1,710	7,779	25,483	38,190	46,880	47,537	356,280	Inflow, Oso P.P.
0	1	8	2	0	0	11	Deliveries
2,015	6,970	25,444	39,365	45,565	47,555	350,099	Outflow Through Warne to Pyramid Lake
-539	667	-421	-1,192	1,306	30	521	Change in Storage
-234	-141	-452	-15	-9	48	-5,649	Operational Losses (-), Gains (+)
							Pyramid Lake Operation
2,015	6,970	25,444	39,365	45,565	47,555	350,099	Inflow, Project
295	291	336	406	664	6,985	19,496	Inflow, Natural
148,633	150,598	108,229	119,311	83,221	57,447	1,231,622	Inflow, Pumpback from Elderberry Forebay
0	0	0	0	0	0	0	Deliveries (Fish Enhancement)
0	0	0	0	0	0	0	Deliveries
0	0	3	0	0	0	3	Delivered to Dept. of Parks and Rec. (State)
1,555	1,565	1,029	345	286	3,705	22,475	Outflow, Pyramid Diversion
153,306	150,504	129,971	159,020	125,823	106,130	1,565,706	Outflow, Angeles Tunnel
-4,828	3,407	2,511	-790	4,140	1,186	715	Change in Storage
-910	-2,383	-495	-507	799	-966	-12,318	Computed Losses (-), Gains (+)
							Elderberry Forebay Operation
153,306	150,504	129,971	159,020	125,823	106,130	1,565,706	Inflow, Project through Castaic P-G Plant
0	0	0	0	71	790	4,534	Inflow, Natural
148,633	150,598	108,229	119,311	83,221	57,447	1,231,622	Outflow, Pumpback to Pyramid Lake
0	4,652	19,117	41,644	43,595	52,176	334,781	Outflow, Project Water Released to Castaic Lake
4,555	-3,487	1,668	-3,280	-2,142	-3,884	-2,838	Change in Storage
-118	1,259	-957	-1,345	-1,220	-1,181	-6,675	Computed Losses (-), Gains (+)
							Castaic Lake Operation
0	4,652	19,117	41,644	43,595	52,176	334,781	Inflow, Project
0	0	0	0	23	481	4,941	Inflow, Natural
24,493	24,687	21,953	37,891	30,260	16,167	323,201	Delivered to Contracting Agencies
14	38	5	34	0	5	291	Deliveries to Recreation (State)
282	144	194	429	297	681	12,891	Outflow, Castaic Lagoon
-25,280	-20,860	-3,046	2,612	13,116	34,644	-1,272	Change in Storage
-491	-643	-11	-678	55	-1,160	-4,611	Computed Losses (-), Gains (+)
							Castaic Lagoon Operation
282	144	194	429	297	0	1,558	Inflow (Recreation Entitlement Deliveries)
0	0	0	0	0	681	11,333	Inflow
0	0	0	0	0	0	0	Inflow, Non-project
149	150	145	194	137	465	11,283	Outflow
131	140	129	109	98	82	1,275	Deliveries to Recreation (State)
2	-146	-80	126	62	134	500	Change in Storage
0	0	0	0	0	0	167	Computed Losses (-), Gains (+)

Glossary

accretion - the water accumulated and retained within a service area.

acre-foot (AF) - a quantity or volume of water covering one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons.

active storage capacity - the total usable reservoir capacity available for seasonal or cyclic water storage. It is gross reservoir capacity minus inactive storage capacity.

afterbay - a reservoir that regulates fluctuating discharges from a hydroelectric power plant or a pumping plant.

alluvium - a stratified bed of sand, gravel, silt, and clay deposited by flowing water.

aquifer - a geologic formation that stores and transmits water and yields significant quantities of water to wells and springs.

average annual runoff - the average value of annual runoff amounts for a specified area calculated for a selected period of record that represents average hydrologic conditions.

balanced water conditions - exist when upstream reservoir storage releases, plus other inflows, approximately equal the water supply needed to (1) satisfy Sacramento Valley and Sacramento-San Joaquin Delta in-basin needs, including Delta water quality requirements, and (2) meet export needs.

benthic invertebrates - aquatic animals without backbones that dwell on or in the bottom sediments of fresh or salt water. Examples: clams, crayfish, and a wide variety of worms.

biota - all living organisms of a region, as in a stream or other body of water.

brackish water - water containing dissolved minerals in amounts that exceed normally acceptable standards for municipal, domestic, and irrigation uses. Considerably less saline than sea water.

carriage water - the amount of water needed above an increased export so as to not increase salinity in the Delta.

conjunctive use - the operation of a ground water basin in combination with a surface water storage and conveyance system. Water is stored in the ground water basin for later use by intentionally recharging the basin during years of above-average water supply.

Decision 1485 operating criteria - standards for operating water project facilities under Water Rights Decision 1485 regarding the Sacramento-San Joaquin Delta and Suisun Marsh, adopted by the State Water Resources Control Board, August 1978.

Delta consumptive use - the sum of evapotranspiration and changes in soil moisture of Delta lands and evaporation from Delta channels.

Delta outflow index a - calculated approximation of this seaward freshwater outflow as it passes Chipps Island near Pittsburg, beyond the confluence of the Sacramento and San Joaquin Rivers.

depletion - the water consumed within a service area and no longer available as a source of supply.

dissolved organic compounds - carbon substances dissolved in water.

drainage basin - the area of land from which water drains into a river; for example, the Sacramento River Basin, in which all land area drains into the Sacramento River. Also called, "catchment area," "watershed," or "river basin."

drought condition - hydrologic conditions during a defined drought period during which rainfall and runoff are much less than average.

ecology - the study of the interrelationships of living organisms to one another and to their surroundings.

ecosystem - recognizable, relatively homogeneous units, including the organisms they contain, their environment, and all the interactions among them.

effluent - waste water or other liquid, partially or completely treated or in its natural state, flowing from a treatment plant.

environment - the sum of all external influences and conditions affecting the life and development of an organism or ecological community; the total social and cultural conditions.

estuary - the lower course of a river entering the sea influenced by tidal action where the tide meets the river current.

evapotranspiration (ET) - the quantity of water transpired (given off), retained in plant tissues, and evaporated from plant tissues and surrounding soil surfaces. Quantitatively, it is usually expressed in terms of depth of water per unit area during a specified period of time.

evapotranspiration of applied water (ETAW) - the portion of the total evapotranspiration which is provided by irrigation.

forebay - a reservoir or pond situated at the intake of a pumping plant or power plant to stabilize water levels; also a storage basin for regulating water for percolation into ground water basins.

fry - a recently hatched fish.

gross reservoir capacity - the total storage capacity available in a reservoir for all purposes, from the streambed to the normal maximum operating level. Includes dead (or inactive) storage, but excludes surcharge (water temporarily stored above the elevation of the top of the spillway).

ground water - water that occurs beneath the land surface and completely fills all pore spaces of the alluvium, soil or rock formation in which it is situated.

ground water basin - a ground water reservoir, defined by an overlying land surface and the underlying aquifers that contain water stored in the reservoir.

ground water overdraft - the condition of a ground water basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average.

ground water recharge - increases in ground water storage by natural conditions or by human activity.

ground water table - the upper surface of the zone of saturation, except where the surface is formed by an impermeable body.

hydraulic barrier - a barrier developed in the estuary by release of fresh water from upstream reservoirs to prevent intrusion of sea water into the body of fresh water.

hydrologic balance - an accounting of all water inflow to, water outflow from, and changes in water storage within a hydrologic unit over a specified period of time.

hydrologic basin - the complete drainage area upstream from a given point on a stream.

hydrologic region - a study area, consisting of one or more planning subareas.

joint-use facilities - specific pumping plants, power plants, canals, and reservoirs in which both State and federal agencies participated in the construction, use, and maintenance.

land subsidence - the lowering of the natural land surface in response to earth movements; lowering of fluid pressure (or lowering of ground water level); removal of underlying supporting materials by mining or solution of solids, either artificially or from natural causes; compaction caused by wetting (hydrocompaction); oxidation of organic matter in soils; or added load on the land surface.

megawatt - one million watts.

milligrams per liter (mg/L) - the weight in milligrams of any substance dissolved in one liter of liquid; nearly the same as parts per million.

natural flow - the flow past a specified point on a natural stream that is unaffected by stream diversion, storage, import, export, return flow, or change in use caused by modification in land use.

percolation - the downward movement of water throughout the soil or alluvium to a ground water table.

permeability - the capability of soil or other geologic formations to transmit water.

phytoplankton - minute plants, usually algae, that live suspended in bodies of water and that drift about because they cannot move by themselves or because they are too small or too weak to swim effectively against a current.

pollution (of water) - the alteration of the physical, chemical, or biological properties of water by the introduction of any substance into water that adversely affects any beneficial use of water.

prior water right - a water designation used for water delivered based on its use prior to SWP construction.

pumping-generating plant - a plant at which the turbine-driven generators can also be used as motor-driven pumps.

recharge basin - a surface facility, often a large pond, used to increase the percolation of surface water into a ground water basin.

riparian vegetation - vegetation growing on the banks of a stream or other body of water.

runoff - the total volume of surface flow from an area during a specified time.

Sacramento River index - the sum of the Sacramento Valley's unimpaired runoff at the following four locations: Sacramento River near Red Bluff; total Feather River inflow to Lake Oroville; Yuba River at Smartville; and total American River inflow to Folsom Lake.

salinity - generally, the concentration of mineral salts dissolved in water. Salinity may be measured by weight (total dissolved solids), electrical conductivity, or osmotic pressure. See ***total dissolved solids*** .

salinity intrusion - the movement of salt water into a body of fresh water. It can occur in either surface water or ground water bodies.

salt-water barrier - a physical facility or method of operation designed to prevent the intrusion of salt water into a body of fresh water.

sediment - soil or mineral material transported by water and deposited in streams or other bodies of water.

seepage - the gradual movement of a fluid into, through, or from a porous medium.

service area - the geographical land area served by a distribution system of a water agency.

snow water content - a calculated or measured amount of water contained in packed snow based on its depth and density.

spawning - the depositing and fertilizing of eggs (roe) by fish and other aquatic life.

streamflow - the rate of water flow past a specified point in a channel.

surplus water - developed water supplies in excess of contract entitlement or apportioned water.

total dissolved solids (TDS) - a quantitative measure of the residual minerals dissolved in water that remain after evaporation of a solution. Usually expressed in milligrams per liter. See ***salinity***.

transpiration - an essential physiological process in which plant tissues give off water vapor to the atmosphere.

unimpaired runoff - represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds.

waste water - the water, liquid waste, or drainage from a community, industry, or institution.

water conservation - reduction in applied water due to more efficient water use.

water quality - used to describe the chemical, physical, and biological characteristics of water, usually in regard to its suitability for a particular purpose or use.

water right - a legally protected right to take possession of water occurring in a natural waterway and to divert that water for beneficial use.

water table - see ***ground water table***.

water year - a continuous 12-month period for which hydrologic records are compiled and summarized. In California, it begins on October 1 and ends September 30 of the following year.

watershed - see ***drainage basin***.